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FOOD TECHNOLOGY ABSTRACTS

Vol. 28 No. 9
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FOOD TECHNOLOGY ABSTRACTS

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CONTENTS

ABBREVIATIONS

A	ampere
AAS	atomic absorption spectrometry
ADP	adenosine diphosphate
Anon.	Anonymous
AOAC	Association of Official Analytical Chemists
approx.	approximately
atm	atmosphere
ATP	adenosine triphosphate
a_w	water activity
BHA	butylated hydroxyanisole
BHT	butylated hydroxytoluene
BOD	biological oxygen demand
b.p.	boiling point
Btu	British thermal unit
c-	centi- [as in cm, cm^2, cm^3]
cal	calorie
cd	candela
°C	degree centigrade
Ci	curie
CMC	carboxymethyl cellulose
COD	chemical oxygen demand
coeff.	coefficient
conc.	concentrated
concn.	concentration
cv.	cultivar
cwt	hundredweight
d-	deci-
DE	dextrose equivalent
detn.	determination
DFD	dark firm dry
diam.	diameter
dil.	dilute
DM	dry matter, Deutsche Mark
DNA	deoxyribonucleic acid(s)
dyn	dyne
E.	East, Eastern, etc
ECD.	electron capture detection
EDTA	ethylenediaminetetraaceti acid
Eh	oxidation-reduction potential
ELISA	enzyme-linked immunosorbent assay
f-	femto-[10^{-15}, as in fCi]
°F	degree Fahrenheit
FAO	Food and Agricultural Organization
FDA	Food and Drug Administration
FID	flame ionization detection
fl oz	fluid ounce
f.p.	freezing point
ft	foot, feet
g	gram
GC	gas chromatography
gr	gravity
gal	gallon
gf	gram-force
GLC	gas-liquid chromatography
h	hour
ha	hectare
HDPE	high density polyethylene
hl	hectolitre [100 l]
hp	horse power
HPLC	high performance/pressure liquid chromatography
HTST	high temperature short tim
Hz	hertz [frequency cycles/s]
in	inch
IR	infrared
IU	international unit
J	joule
k-	kilo- [as in kcalk, kg]
K	Kelvin
l	litre
lb	pound
lbf	pound-force
LDPE	low density polyethylene
m-	milli- [as in mg, ml, mm]
m-equiv	milli-equivalent
M	molar concentration
M-	mega- [as in Mrad]
max.	maximum
min	minute [time]
min.	minimum
mol	mole
mol.wt.	molecular weight
m.p.	melting point
MPN	most probable number
MS	mass-spectrometry
n-	nano-[10^{-9}, as in nm]
N	Newton [kg m/s^2]
N.	North, Northern, etc
N	Normal concentration
NMR	nuclear magnetic resonance
NPU	net protein utilization
oz	ounce
p-	pico- [10^{-12}, as in pCi]
P	Poise
p	probability
Pa	pascal (N/M^2)
PAGE	polyacrylamide gel electrophoresis
PER	protein efficiency ratio
p.p.b.	parts per billion
p.p.m.	parts per million
PSE	pale soft exudative
PTFE	polytetrafluorethylene
PVC	polyvinyl chloride
PVDC	polyvinylidene chloride
qt	quart
R	rontgen
rad	rad or radian
ref.	reference(s)
rev/min	revolutions per minute
RH	relative humidity
RNA	ribonucleic acid(s)
S.	South, Southern, etc.
s.d.	standard deviation
SDS	sodium dodecylsulphate
s.e.	standard error
s	second [time]
SNF	solids-not-fat
sp.,spp.	species
sp.gr.	specific gravity
summ.	summary
Suppl.	Supplement
t	metric tonne
temp.	temperature
TLC	thin layer chromatography
TS	total solids
UHT	ultra-high temperature
UV	ultraviolet
V	volt
var.	variety
vol.	volume
v/v	volume/volume
W	watt
W.	West, Western, etc.
WHO	World Health Organization
w/v	weight/volume
wk	week
wt.	weight
yd	yard
yr	year
μ	micro-[as in g, μm]
%	per centum
>	greater than
≥	greater than or equal to; not less than
<	less than
≤	less than or equal to; not greater than

ABBREVIATIONS FOR LANGUAGES

Language of text	
Dutch	Nl
French	Fr
German	De
Italian	It
Japanese	Ja
Norwegian	No
Spanish	Es
Swedish	Sv

GENERAL

1810

Konik (CM), Miskelly (DM) and Gras (PW). **Contribution of starch and non-starch parameters to the eating quality of Japanese white salted noodles.** *Journal of the Science of Food and Agriculture* 58(3): 1992: 403-406

Viscograph paste viscosity parameters of starches isolated from 42 wheat var. were highly correlated with each other and with measures of the quality of the derived Japanese white salted noodles. Better correlations with noodle quality were obtained when measurements of wheat protein and grain hardness (PSI) as well as a starch viscosity parameter were included in the regression equations. AA

1811

Naik Kurade (G) and Kurade (SA). **Fruit and vegetable industry - a perspective.** *ISI Bulletin* 7(3): 1993: 84-85

The potential and problems (along possible solutions) of fruits and vegetables processing industry in India, fruit technology, dehydration industry (availability of raw materials, diversification of production pattern) and way to European Common Market are covered. SRA

1812

Lele (SS). **Effluent treatment in food industry.** *Chemical Weekly* 39(1): 1993: 129-135

Aspects covered include: characterization of effulents, properties of food processing effluents (meat, poultry and fish processing industry, dairy and milk industry, Fruit and vegetable processing, beverages and miscellaneous), pretreatment processes, primary treatment, anaerobic digestion, polishing step, past treatments, new bioreactors, distillery effluent treatment (case study) and thermal treatment. BV

FOO PROCESSING

Nil

FOOD PACKAGING

1813

Chakrabarti (S). **Packaging industry - an outlook.** *Indian Miller* 23(6): 1993: 21-26

Reviews the status of packaging industry in India with that of developed economy beside discussing availability of material, future trends in packaging and adaptation in packaging technology. SRA

1814

Satyanarayana Rao (TS), Sankaran (R) and Rama Rao (MV). **Studies on the safety of water stored in high density polyethylene water bottles.** *Journal of Food Science and Technology (India)* 30(4): 1993: 293-295

Albino rats were fed with HDPE bottle stored water for 3 days upto a period of 6 months spread over 2 generations. Body wt., food consumption, feed efficiency ratio and organ to body wt. ratio in both the generations did not differ significantly compared to control group. Data indicated HDPE bottle stored water is safe for use specially for the defence personnel at operation locations. SD

1815

O'Connor (RE), Skarshewski (P) and Thrower (SJ). **Modified atmosphere packaging of fruits, vegetables, seafood and meat: State of the art.** *Food Chemistry* 7(3): 1992: 127-136

Aspects covered in this review are: modified atm. packaging (MAP) and controlled atm. storage, mechanisms for shelf-life extension using MAP, passive and active modification of atm. within packages, fruits and vegetables (the effect of modified atm. on microorganisms), seafood (unique features of seafood, vacuum packaging and MAP) and meat. 57 references. SRA

1816

Johansson (F), Leufven (A) and Eskilson (M). **Quantification of aroma vapours sorbed in polyethylene films using supercritical carbon dioxide.** *Journal of the Science of Food and Agriculture* 61(2): 1993: 241-244

Extraction with supercritical carbon dioxide was used to quantify the amounts of 7 different aroma vapours sorbed in polyethylene films. The method was found to completely extract all aroma compounds from the films. The solution of aroma compounds in the polymer films decreased with increasing polymer density. Monoeterpenes were always completely sorbed in the films, whereas aldehydes and ketones had a much lower affinity for the films. The sulphur containing compound, thiophene, was difficult to analyse due to its adsorption on metal surfaces. AA

FOOD ENGINEERING AND EQUIPMENT

1817

James (SJ). **Factors affecting the microwave heating of chilled foods.** *Food Science and Technology Today* 7(1): 1993: 28-36

Factors that govern the amount of microwave energy delivered to a water load by a domestic oven; factors affecting temp. distribution in food; requirements of a microwave reheating process; interaction between food and oven; and reheating guidelines to develop convenience meal are discussed. GS

1818

Datta (T), De (P), Dutta (BK) and Ray (P). **Drying characteristics during air dehydration of foods.** *Indian Journal of Technology* 31(8): 1993: 610-612

Diffusivity in ginger was obtained from the data collected during the through-circulation drying of ginger slices. Moisture distribution during the process agreed with the theoretical model assuming constant diffusivity. The activation energy was found to be 80.24 kJ mol^{-1}. Water migration within the material by a process of liquid diffusion was confirmed by the Arrhenius type temp. dependence of calculated values of the diffusivity. SRA

1819

Wiese (KL) and Wiese (KF). **A comparison of numerical techniques to calculate broken line heating factors of a thermal process.** *Journal of Food Processing Preservation* 16(5): 1992: 301-312

Numerical methods comprised of least squares, rational functions, minmax and cubic spline were used in conjunction with comparisons of ratios of slopes and coefficient of detn. (R^2) to define the location of the 'break' in a broken line heating curve for canned bean and potato products. From these breaks, the process times B_b were evaluated. These times were not statistically different from the time determined from the same data that had been handplotted. For the rational function method, the approximations and slope ratio curves were quite smooth, although at times the method was sensitive to minor variations in the data points. The cubic spline approximation demonstrated a very smooth curve, a desirable characteristics of this method, but the slope ratio curves from this method fluctuated excessively. AA

1820

Ho (YC) and Yam (KL). **Effect of metal shielding on microwave heating uniformity of a cylindrical food model.** *Journal of Food Processing Preservation* 16(5): 1992: 337-359

Cylindrical model food samples containing 3% agar gel were shielded with metal bands during microwave heating. The metal bands were arranged in various patterns, with different spacing and orientation. The focus of this work was to study how these patterns could affect the heating uniformity and power absorption in the samples. The heating rates of the samples during microwaving were measured with fiberoptic temp. sensors. A two-factor central composite rotatable design and the corresponding response surface methodology were used to analyze the sata. It was found that orientation was an important design parameter, and it was possible to design patterns that could greatly increase the heating uniformity without greatly reducing the power absorption. AA

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

Chemistry

1821

Benway (DA) and Weaver (CM). **Assessing chemical form of calcium in wheat, spinach and kale.** *Journal of Food Science* 58(3): 1993: 605-608

Spinach, wheat and kale represent a broad range in absorption of Ca from foods (5-40%). These plants were intrinsically labeled with ^{45}Ca and examined for ^{45}Ca solubility characteristics, including specific enzyme treatments, subcellular distribution, and *in vitro* bioavailability. Solubility was < 2% for spinach, approx. 40% for wheat and 70% for kale, depending on the solvent. Solubility paralleled the *in vitro* ^{45}Ca bioavailability results of 0.3 plus or minus 0.1%, 26 plus or minus 5.2%, and 76.3 plus or minus 1.2% for these 3 plant foods. Spinach Ca exists largely as Ca oxalate which is not easily dissociated. Phytase treatment of wheat indicated that a major portion of Ca was bound to phytate. Knowledge of the chemical form of Ca in plants can help in designing processing procedures to improve Ca absorption. AA

1822

Hidalgo (FJ) and Zamora (R). **Non-enzymatic browning and fluorescence development in a (E)-4,5-epoxy-(ε)-2-heptenal/lysine model**

system. *Journal of Food Science* 58(3); 1993; 667-670

As a model system for studying oxidized lipid/protein browning, the reaction between (E)-4,5-epoxy-(ε)-2-heptenal (a secondary oxidation product of ω-3 pentaenoic acids) and lysine was studied. CIELAB L*a*b* and fluorescence followed zero-order kinetics, and were always correlated, as a function of time, pH, temp. and epoxyaldehyde/lysine ratio, suggesting parallel reactions for producing brown macromolecular pigments and fluorescent products. Activation energy, according to the Arrhenius equation, was 66.5 and 50 KJ/mol for colour difference and fluorescence intensity, respectively. This model system may help understand the non-enzymatic browning produced by lipids. AA

1823

Riha (WE) and Wendorff (WL). **Browning potential of liquid smoke solutions: Comparison of two methods.** *Journal of Food Science* 58(3); 1993; 671-674

The colour-forming potential of carbonyl compounds from liquid smoke sol. with selected amino acids was determined with a colorimetric procedure used in industry and compared with a colour analysis on filter paper discs. The two methods provided different evaluations of formed colours. Of the carbonyls tested, glycolaldehyde, methylglyoxal and glyoxal showed significant browning potential, while formaldehyde and hydroxyacetone showed very little colour formation. Measurement of browning potential of amino acids varied between the procedures. The disc assay procedure enabled better characterization of smoke colours produced. AA

1824

Hoagland (PD), Konja (G) and Fishman (ML). **Components analysis of disaggregation of pectin during plate module ultrafiltration.** *Journal of Food Science* 58(3); 1993; 680-687

Concn. of commercial lime and citrus was carried out by plate module ultrafiltration with a 300 K cut-off membrane with small changes in intrinsic viscosity and 48 and 55% recoveries. Subsequent ultrafiltration of permeates with a 100K cut-off membrane yielded pectins from retentates with lower viscosities and recoveries of 34 and 39%. Component analysis was applied to concn. and viscosity response curves from high performance size exclusion chromatography. Results suggested viscosity loss was due to passage through the membrane of small pectin molecules and/or aggregates released from breakdown of larger pectin aggregation during 300 K ultrafiltration. Concn. of pectin with min. loss of viscosity requires ultrafiltration which ensures retention of small pectin aggregates. Improved components analysis was developed for characterizing sol. behaviour of pectin during processing. AA

1825

Bemis-Young (GL), Haung (J) and Bernhard (RA). **Effect of pH on pyrazine formation in glucose-glycine model systems.** *Food Chemistry* 46(4); 1993; 383-387

Pyrazines produced from D-glucose/L-glycine model browning system at 8 pH values ranging from 1 to 12 were isolated by extraction and identified by combined GC/MS. 32 compounds were identified in this study including: 19 pyrazines, 9 other nitrogen-containing (non-pyrazine) products, and 4 oxygenated products. As the pH increased, the number of pyrazines produced also increased. The greatest varieties of pyrazines were produced at pH 9.00 and 9.64 in which all 19 pyrazines detected in this study were formed at trace or greater quantities. The major pyrazines generated were 2,3,5-trimethylpyrazine, 2,5-dimethylpyrazine, 2-ethyl-3,5-dimethylpyrazine, 2,3-diethyl-5-methylpyrazine, 2,3,5,6-tetramethylpyrazine and 2,3-diethylpyrazine. AA

Chemistry (Analytical)

1826

Stachowicz (W), Strelczak-Burlinska (G), Michalik (J), Wojtowicz (A), Dziedzic-Goclawska (A), Ostrowski (K). **Application of Electron Paramagnetic Resonance (EPR) spectroscopy for control of irradiated food.** *Journal of the Science of Food and Agriculture* 58(3); 1992; 407-415

Four groups of foodstuffs were irradiated in a ^{60}Co source with doses from 0.3 to 10 kGy and subsequently measured by EPR spectrometry at room temp. in air: (1) poultry bones and fins, scales and bones of carp, (2) seeds of selected fruits, (3) dehydrated mushrooms, and (4) a selected set of spices and herbs. Qualitative and, in some cases, quantitative data related to the absorbed dose of radiation were collected. In the irradiated bones from poultry and carp an asymmetric singlet ($g_{\parallel}$ = 2.0030, $g_{\perp}$ = 1.9973; ΔH_{pp} = 0.85 mT) was detected which was stable at room temp. and was similar to that previously found in irradiated mammalian bones. Another stable EPR signal (g_o = 2.0024, ΔH_{pp} = 0.56 mT) was found in the fins and scales of carp which was about 5 times more intense in fins than in scales. In pips of pears irradiated with a dose of 3 kGy, a signal which was about twice as intense as

the endogenous signal was recorded. A multicomponent EPR signal derived from the stones of dates differed from the endogenous signal even when a low dose (0.5 kGy) was applied. A multicomponent EPR signal is also observed in dried mushrooms irradiated with a dose of 3 kGy. In white mustard, paprika and chilli no native EPR signal exists and a radiation-induced stable EPR signal can still be observed after a period of 3 months. The radiation induced EPR signal in black pepper was highly sensitive to moisture and disappeared, yet the native signal survived. The pilot exp. performed with irradiated stones of cherries, plums, lemons, appie pips, raspberries, cranberries, red currants, blackcurrants, gooseberries and tomatoes showed the induction of short-lived EPR signals of no practical use for the control of food irradiation. AA

1827

Tsumura (F), Ohsako (Y), Haraguchi (Y), Kumagai (H), Sakurai (H), Ishii (K). **Rapid enzymatic assay for ascorbic acid in various foods using peroxidase.** *Journal of Food Science* 58(3): 1993: 619-622, 687

Based on direct spectrophotometry and the oxidation of ascorbic acid by guaiacol peroxidase, this method was simple, rapid and highly specific for ascorbic acid. No interference was seen for any food sample tested, including vegetables, fruits, potatoes, beans, chicken liver, processed food, tea and seaweed. This method was applicable to coloured and/or sugar-rich samples, and more precise than officially adopted chemical methods. AA

1828

Kerr (WL), Ju (J) and Reid (DS). **Enthalpy of frozen foods determined by differential compensated calorimetry.** *Journal of Food Science* 58(3): 1993: 675-679

Frozen samples were placed in one of two insulated vessels at room temp. Enthalpy was measured by the electrical energy required to reverse the temp. differential that developed. Tests with pure ice agreed to within 0.3% of expected values. Measurements of beef, bread, egg white, and applesauce were similar to published values. The change in av. enthalpy during freezing was examined and agreed with an enthalpy-based freezing model. Differential compensated calorimetry affords several advantages and was particularly useful for rapid measurement of enthalpy in commercial freezer conditions. AA

1829

Nath (A), Patyal (SK) and Dubey (JK). **A new protocol for rapid sample preparation for spectrophotometric estimation of carbendazim residues in apple, tomato and mushroom.** *Journal of Food Science and Technology (India)* 30(4): 1993: 239-240

The method involves extraction with ethyl acetate, clean-up by partitioning with dilute hydrochloric acid and estimation of carbendazim (1-10 p.p.m.) at 280 nm. SD

1830

Linssen (JPH), Janssens (JLGM), Roozen (JP) and Posthumus (MA). **Combined gas chromatography and sniffing port analysis of volatile compounds of mineral water packed in polyethylene laminated packages.** *Food Chemistry* 46(4): 1993: 367-371

Commercial mineral waters in polyethylene lined Al/cardboard packages were stored at 40°C. Intensities of descriptors-synthetic, musty, sickly, metallic, astringent and dry were assessed by taste testing. Volatile compoundsof the samples analysed by sniffing the effluent of a GC column yield similar descriptors. The voaltile compounds were tentatively unknown carbonyls ranging between 10-15 p.p.b. appear to be responsible for these profiles. Storage at hgiehr temp. for a long duration will cause flavour deterioration. SD

FOOD MICROBIOLOGY AND HYGIENE

Enzymes

1831

Devashish (K), Pai (AP) and Aswani (VH). **Use of triton X-100 to enhance pectinase release in fungi immobilized within polyurethane foam.** *Indian Journal of Experimental Biology* 31(7): 1993: 641-642

Effect of Triton X-100 on pectinase release by *Torulomyces lager*, *Aspergillus terreus* and a *Fusarium* sp. immobilized on a porous biomass support (polyurethane foam) was studied. Increase in the release of pectinases in the culture broth containing Triton X-100 was evidenced by assay results. The results suggest that the pectinases could be cell-bound rather than simply extracellular. AA

Fermented foods

Miso

1832

Asahara (N), Zhang (XB) and Ohta (Y). **Antimutagenicity and mutagen-binding activation of mutagenic pyrolyzates by microorganisms isolated from Japanese *miso*.** *Journal of the Science of Food and Agriculture* 58(3): 1992; 395-401

The microbiological flora of *miso*, a traditional fermented food in Japan, were investigated. Bacteria, a yeast and a mould were isolated and identified as *Pediococcus acidilactici*, *leuconostoc paramesenteroides*, *Micrococcus halobius*, *Zygosaccharomyces rouxii* and *Aspergillus* sp. *P. acidilactici* strains were dominant bacteria in *miso*. The binding and antimutagenic activities of all microbial strains towards mutagenic pyrolysates were investigated. The lyophilised cells of strains of the bmacteria and yeast showed the largest antimutagenic effect on 3 amino 1 methyl [H]pyrido[4,3-b]indole (Trp-P-2), but the mould was less antimutagenic than the bacteria and yeast. Most strains tested had no effective antimutagenic activity against 2-amino-3-methyl imidazo[4,5-f] quinoline (IQ). Trp-P-2 was effectively bound by all non-mould strains but binding of IQ to cells was much less effective. Among the strains tested, *Leu. paramesenteroides* No 28 indicated the highest binding activity, not only to Trp-P-2 but also to IQ (30% binding capacity). As the concn. of Trp-P-2 was increased, the limits of binding ability of *P. acidilactici* No 23, *z rouxii* No 6 and *Aspergillus* sp 1 were 650, 500 and 400 µg/5 mg respectively. The binding ability and antimutagenicity for Trp-P-2 of all strains was reduced by autoclaving at 100°C for 5 min or 121°C for 15 min, by 6-20% and 7-28%, respectively. *Aspergillus* sp 1 was unaffected by autoclaving. The binding ability and antimutagenicity of cell walls towards Trp-P-2 was very high, being more than 85% effective, but it was lower than that of cytoplasm. AA

Microorganisms

1833

Li (K-Y) and Torres (JA). **Microbial growth estimation in liquid media exposed to temperature fluctuations.** *Journal of Food Science* 58(3): 1993; 644-648

Comparisons of linear, square root and Arrhenius specific growth rate-temp. models showed no clear overall preference. At low a_w and refrigeration temp., the linear model was satisfactory for *Brochothrix thermosphacta* and *Pseudomonas fluorescens*. A linear relationship between (specific growth rate)$^{-1}$ and lag phase was observed for these two psychrotrophs. The R_2 for *B. thermosphacta* in 3% (a_w = 0.968), 6% (a_w = 0.950), and 9% NaCl (a_w = 0.943) media was 0.865, 0.946 and 0.994, respectively. In 8% (a_w = 0.973) and 20% (a_w = 0.948) glycerol media, the R_2 was 0.998 and 0.999, respectively. R_2 for *P. fluorescens* growth in NaCl (3 or 4%) or glycerol (10 or 20%) media was > 0.99. A cumulative growth adaptation function successfully estimated microbial growth at fluctuating temp. AA

Bacteria

1834

Thampuran (N) and Gopakumar (K). **Freezing temperature and freezing menstruum on the survival of selected marine bacteria.** *Fishery Technology* 30(2): 1993; 139-146

The survival pattern of dominant bacterial genera encountered in fishery environs viz. *Pseudomonas*, *Moraxella*, *Acinetobacter*, *Vibrio*, *Flavobacterium*, *Micrococcus* and *Bacillus* were investigated at frozen storage temp. of -39 plus or minus 2°C and -20 plus or minus 2°C in various suspending fluids over a period of 1 yr. The survival was max. in fish muscle substrate for *Vibrio*, *Moraxella*, *Acinetobacter*, *Micrococcus*, and *Bacillus* sp. For genera *Pseudomonas* and *flavobacterium*, there was no significant difference in survival among the various freezing menstruum. Max. reduction in cell numbers occurred during freezing period or in the period immediately after freezing. Based on the studies, the sensitivity of the bacterial genera to frozen storage was in the order of *Vibrio* > *Bacilius* > *Pseudomonas* > *Moraxella* > *Acinetobacter* > *Flavobacterium* > *Micrococcus*. AA

Clostridium sporogenes

1835

Rodrigo (M), Martinez (A), Sanchez (T), Peris (MJ) and Safon (J). **Kinetics of *Clostridium sporogenes* PA3679 spore destruction using computer-controlled thermoresistometer.** *Journal of Food Science* 58(3): 1993; 649-652

A modified version of a computer-controlled thermosresistometer was used, with and without micropurge, to study the inactivation kinetics of *Cl. sporogenes* PA 3679 spore destruction between 121-143°C in phosphate buffer (pH 7) and in mushroom extract acidified with citric acid. A shorter temp. come up time was observed with micropurge. The thermal death time (TDT) curve for spores in phosphate buffer with micropurge followed a straight line (z = 9.5°C). Without micropurge the curve could be described by two lines with z = 10.0°C

for temp. up to 132.5°C and z = 18.3°C for higher temp. The spore heat resistance in mushroom extract was lower than in phosphate buffer. D_T values decreased exponentially as temp. increased, but acidification did not reduce thermal resistance at high temp. AA

Lactobacillus

1836
Sheu (TY) and Marshall (RT). **Microentrapment of lactobacilli in calcium alginate gels.** *Journal of Food Science* 58(2): 1993; 557-561

A procedure was developed to entrap culture bacteria using a two-phase (water/oil) system. It consisted of 3% sodium alginate mixed with microbial cells and suspended in an oil bath containing 0.2% Tween 80. While stirring at 200 r.p.m., calcium chloride (0.05M) sol. was added to break the water/oil emulsion and form calcium alginate gel. The calcium alginate beads containing microbial cells had mean diam. of 25-35 μm (range 5-100 μm). The entrapped microbial cells were released completely from the drop shaped beads by gentle shaking in 0.1M phosphate sol. (pH 7.5) for 10 min. About 40% more lactobacilli survived freezing of ice milk when they were entrapped in calcium alginate than when they were not entrapped. AA

Fungi

Mushrooms

1837
Sugiyama (K), Kawagishi (H), Tanaka (A), Saeki (S), Yoshida (S), Sakamoto (H), Ishiguro (Y). **Isolation of plasma cholesterol-lowering components from ningyotake (*Polyporus confluens*) mushroom.** *Journal of Nutritional Science and Vitaminology* 38(4): 1992; 335-342

The present study was undertaken to isolate component(s) which contributes to the hypocholesterolemic action of Ningyotake (*P. confluens*) mushroom. The mushroom powder was extracted with 80% ethanol, and the extract and residue were fractioned into 5 fractions according to the solubility to solvents. When each fraction was added to a diet containing 1% cholesterol and 0.25% sodium cholate and fed to rats, the plasma cholesterol level was significantly decreased only by ethyl acetate-soluble fraction. Therefore, ethyl acetate-soluble fraction was further fractionated by silica gel column chromatography. Two major compounds, which comprised 45.0% and 28.5% of the ethyl acetate-soluble fraction, were obtained in a pure form by the chromatography, and the compounds were identified as grifolin (2-*trans*, *trans*-farnesyl-5-methylresorcinol) and neogrifolin (4-*trans*, *trans*-methylresorcinol), respectively. The addition of grifolin and neogrifolin to the high cholesterol diet was found to lower plasma cholesterol level significantly. AA

1838
Dawley (RM) and Flurkey (WH). **4-Hexylresorcinol, a potent inhibitor of mushroom tyrosinase.** *Journal of Food Science* 58(3): 1993; 609-610, 670

The results indicated that 4-Hexylresorcinol (4HR) is a potent inhibitor of mushroom tyrosinase. This inhibitor is as effective as silicylhydroxamic acid or tropolone at equal or lower concn. and much safer to use. In crude extracts of mushroom, the levels of 4HR needed for inhibition of tyrosinase were much lower. Electrophoretic analysis, coupled with isoenzyme staining in the presence and absence of 4HR, showed inhibition of tyrosinase isoforms but not of lactase. Higher levels of 4HR may be needed to prevent browning in whole mushrooms. SRA

1839
Vetter (J). **Chemical composition of eight edible mushrooms.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 196(3): 1993; 224-227 (De)

A comparative analysis of crude protein, crude ash, P, K and Ca contents of 57 samples of 8 common edible mushroom species was made. The most important protein sources were: *Marasmius oreades* and *Lepista nebularis*. Species of the *Boletaceae* formed an intermediate group, while relatively proteinless species were: *Armillariella mellea* and *Cratarellus cornucopioides*. The lowest crude protein content was established in *Cantharellus cibarius*. The ash contents varied more widely. The greatest P contents were measured in *Lepista nebularis* and *Marasmius oreades* but most mushrooms contained 6-7 gP.kg. The analysed mushroom samples contained 30-40 gK/kg dry wt. and 0.2 - 0.3 gCa/kg. These analyses are important from the point of view of the nutritional role of mushrooms. AA

BIOTECHNOLOGY

Nil

TISSUE CULTURE

Nil

FOOD ADDITIVES

Colourants

1840

Saito (K), Miyamoto (K-I) and Katsukura (M). **Influence of external additives on the preservation of carthamin red colour: An introductory test for utilizing carthamin as a herbal colourant of processed foods.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 196(3): 1993; 259-260

Sweeteners

1841

Canales (I), Borrego (F) and Lindley (MG). **Neohesperidin dihydrochalcone stability in aqueous buffer solutions.** *Journal of Food Science* 58(3); 1993; 589-591, 643

The degradation of neohesperidin dihydrochalcone (NHDC) in sol. was studied at different temp. (30-60°C) and pH values (1-7). Pseudo-first order kinetics were observed across the temp. and pH range. Max. stability was at pH 3-5. These data may be used to predict sweetener stability to typical conditions prevailing during manufacture and storage of beverages and to food processing at high temp. Results indicate NHDC would be stable throughout the normal shelf-life of soft drinks and would also withstand pasteurization and UHT processes. AA

1842

Lindley (MG), Beyts (PK), Canales (I) and Borrego (F). **Flavour modifying characteristics of the intense sweetener neohesperidin dihydrochalcone.** *Journal of Food Science* 58(3); 1993; 592-594, 666

Addition of 1-4 p.p.m. neohesperidin dihydrochalcone to sweet and nonsweet food products modified the intensity of some flavour attributes in all products evaluated, as determined by a panel of trained assessors during a series of descriptive attribute analyses. Flavour enhancements were perceived in all products, although no consistent pattern of enhancement was observed across the product range. Fruit flavours were enhanced across all fruity products, as were some odour attributes. Intensity reductions of some sharp or spicy flavour attributes were also recorded. The great majority of flavour modifications induced were considered to bring about improvements in products sensory quality. AA

1843

Bornstein (BL), Wiet (SG) and Pombo (M). **Sweetness adaptation of some carbohydrate and high potency sweeteners.** *Journal of Food Science* 58(3); 1993; 595-598

A sip-and-swallow procedure designed to provide stimulation resembling normal drinking was employed to investigate adaptation to sweetness and sourness over time in a model beverage system. Intensity judgements were made using magnitude estimation. Adaptation to sweeteners (sucrose, HFCS, sucralose and aspartame) alone and in blends was evaluated. Different degrees of sweetness adaptation were observed. Sucrose and HFCS displayed less adaptation than the high potency sweeteners, sucralose and aspartame. Blends containing two high potency sweeteners adapted to a greater degree than the individual components. Blends containing a carbohydrate and a high potency sweetener showed less adaptation than those containing two high intensity sweeteners. Sourness adaptation was not demonstrated. AA

1844

Wiet (SG), Ketelsen (SM), Davis (TR) and Beyts (PK). **Fat concentration affects sweetness and sensory profiles of sucrose, sucralose and aspartame.** *Journal of Food Science* 58(3); 1993; 599-602, 666

The sensory characteristics of sucralose, aspartame and sucrose were studied in an unflavoured lipid model system varying in fat levels. One study investigated the effects of fat on the potencies (vs. sucrose) of sucralose and aspartame. Absolute changes in all three sweeteners in taste, temporal and mouthfeel properties at fixed concn. across a wide fat range was examined. Results indicated a modest decrease in the potencies of sucralose and aspartame across fat concn., especially at lower sweetness levels. All sweeteners responded similarly to changes in fat concn. Independent of fat level, sucralose was perceived more similar to aspartame in onset, bitterness, and aftertaste, than to sucrose. AA

CEREALS

Oats

1845

Dawkins (NL) and Nnanna (IA). **Oat gum and β-glucan extraction from oat bran and rolled oats: Temperature and pH effects.** *Journal of Food Science* 58(3); 1993; 562-566

Treatment combinations of pH 9.2/50°C or pH 10.5/50°C/55°C produced oat gum with little or no starch contamination. Oat protein and starch were extracted in good yields. Models from multiple regression and 3-D surface plots confirmed the usefulness of temp. and pH treatment combinations in predicting extractability of oat gum/β-glucan. The regression model for oat bran showed a strong dependence of oat gum/β-glucan extractability on pH. SRA

Wheat

1846

Allmann (M), Candrian (U), Hofelein (C) and Luthy (J). **Polymerase chain reaction (PCR): A possible alternative to immunochemical methods assuring safety and quality of food. Detection of wheat contamination in non-wheat food products.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 196(3): 1993: 248-251

A rapid, sensitive and specific analysis of food samples determining wheat contamination was established using polymerase chain reaction (PCR) technology. First, primers specific for highly conserved eukaryote DNA sequences were used to prove isolated nucleic acid substrate accessibility to PCR amplificaton. Subsequently, a highly repetitive and specificgenomic wheat DNA segment was amplified by PCR for wheat detection. This assay was tested with 35 different food samples ranging from bakery additives to heated and processed food samples. In addition, the PCR method was compared to an immunochemcial assay that detected the wheat protein component gliadin. Combination of both assays allowed a detailed characterization of wheat contamination. Hence, wheat flour contamination could be distinguished from gliadin used as a carrier for spices as well as from wheat starch addition. AA

Wheat flour

1847

Evers (T). **Online quantification of bran particles in white flour.** *Food Science and Technology Today* 7(1): 1993: 23-27

The detection of bran content with image analysis: applicability of the technique to on-line or manual presentation: and its response to bran addition are the aspects covered in this article. GS

MILLETS

1848

Asiedu (M), Nilsen (R), Lie (O) and Lied (E). **Effect of processing (sprouting and/or fermentation) on sorghum and maize. I. Proximate composition, minerals and fatty acids.** *Food Chemistry* 46(4): 1993: 351-353

Sprouting and/or fermentation had no effect on the proximate composition. Sorghum and maize are poor in Ca, Fe, Zn, low in ω3 fatty acids and rich in ω6 fatty acids. Germination enhanced the gross energy of the cereals. Porridges from these cereals require further food supplementation. SD

Corn

1849

Hamilton (RMG) and Thompson (BK). **Chemical and nutrient content of corn (*Zea mays*) before and after being flame roasted.** *Journal of the Science of Food and Agriculture* 58(3): 1992: 425-430

Corn samples before and after flame roasting (110 - 140°C) were compared for mould and mycotoxin content, the true metabolisable energy (TME), TME corrected to zero N balance (TME_n), true available amino acids (TAAA) and true dry matter (DM) digestibility. Results indicate that flame roasting is an effective method for the removal of moulds from corn without influencing the nutritive content and bioavailability of roasted grain. The DM content was higher ($P < 0.05$) and the 100-kernel wt. and mould count were lower ($P < 0.01$) and ($P < 0.05$) respectively for roasted than for the non-roasted corn. Among the 7 sources the N content of the roasted corn was higher ($P < 0.05$) than that of the non-roasted corn. The zearalenone and free ergosterol contents were lower in the roasted than in the non-roasted corn. Roasting had little or no effect on TME_n, TAAA and true DM digestabilities or on the carbohydrate and fibre fractions of the corn samples. GS

Sorghum

1850

Obizoba (IC) and Atii (JV). **Effect of soaking, sprouting, fermentation and cooking on nutrient composition and some anti-nutritional factors of sorghum (Guinesia) seeds.** *Plant Foods for Human Nutrition* 41(3): 1991: 203-212

This study was designed to determine the effect of soaking, sprouting, fermentation and cooking on nutrient composition and some antinutritional factors of sorghum seeds (guinesia). Standard assay procedures were adopted to resolve both the nutrients and the anti-nutritional factors content of the products. Combination of cooking

fermentation improved the nutrient quality and drastically reduced the anti-nutritional factors of safe levels much greater than any of the other processing methods tested. AA

1851

Okeke (AO). **Effect of sprouting and kilning temperatures and germination time on cyanide content in sprouted sorghum. A statistical approach.** *Journal of Food Science and Technology (India)* 30(4): 1993: 283-285

Data on sorghum sprouts showed significant effect of klining temp. (50 - 65°C, temp. of sprouting (20-32°C) and period of sprouting (1-7 days) on cyanide levels. The effect of sprouting period was parabolic in contrast to the linear effects of germination and kilning temp. AA

1852

Manju Singh and Srivastava (S). **Sorghum grain moisture. Its effect on popping quality.** *Journal of Food Science and Technology (India)* 30(4): 1993: 296-297

Ten sorghum genotypes, viz. 'SPV-462', 'Pant Chari', 'SPV-475', 'SPV-881', 'CSH-9', 'CSH-6', 'CSH-11', 'SPH-504', 'CSH-10' and 'SPH-509', were tempered to 12-20% grain moisture level and evaluated for popping %, popping vol., expansion vol. and flake size. The popping % of the genotypes differed significantly at different levels of grain moisture. SPV-881 had the highest popping vol. of 23.22 ml at 12% grain moisture, while genotypes 'SPV-462', 'SPV-881' and 'CSH-6' exhibited highest expansion vol. at same grain moisture. 'SPV-881', 'SPH-504' and 'CSH-10' had the highest flake size at the same level of grain moisture. AA

1853

Lasekan (OO). **Effect of malt milling energy, sedimentation rates and diastatic power measurement in sorghum selection.** *Food Chemistry* 46(4): 1993: 415-417

Sedimentation rates, diastatic power measurments and electrical energy required to mill sorghum malts were determined in 10 cvs FDI, SK, L1412, SSV7, SSV3, L1202, KSV8, FFBL, MORI and MDW from Nigeria. Samples with low milling energy ranked highly in sedimentation and diastatic power measurements. Significant negative correlations between milling energy and sediment rate, r = 0.60 and between milling energy and diastatic power measurement, r = -0.62 were obtained. SD

PULSES

1854

Estevez (AM), Castillo (E), Figuerola (F) and Yanez (E). **Effect of processing on some chemical and nutritional characteristics of pre-cooked and dehydrated legumes.** *Plant Foods for Human Nutrition* 41(3): 1991: 193-201

The effect of processing on chemical composition and protein quality of 3 legumes was studied. The species analyzed were beans (*Phaseolus vulgaris*), Tortola and Cosscorron var.; lentils (*Lens esculenta*), Laird var.; and chick peas (*Cicer arietinum*), California-INIA var. The legumes were soaked in a sol of Na_2 EDTA at 0.03% for 16 h and cooked for a predetermined period for each species. They were dried in a tray drier with cross currents of air flowing at a speed of 10 m/min until the residual moisture content was 8%. The a_w in the resulting products ranged from 0.574 to 0.587, thus completely assuring no microbial activity. No important changes were observed in the legumes protein, fat, or fibre contents after processing. The soaking sol. was effective in reducing the phytic acid content from 2.99 to 1.64 mg/100 g in the Tortola beans, which had the highest acid value prior processing. In all the sp. the heat treatment reduced the activity of the trypsin inhibitors by at least 50%. Cooking and drying significantly increased protein digestibility in all the legumes studied, with chick peas showing the most dramatic increase: from 54.7% pre-processing to 94.9% post-processing. With regard to net protein ratio (NPR), chick peas had a value of 4.03, followed by Tortola beans (3.29), Cosscorron (3.09) and lentils (2.61). The NPR value for the casein diet was 4.20. AA

1855

Pandey (VN) and Srivastava (AK). **Yield and *in vitro* nutritional quality of some leguminous seed protein isolates.** *Plant Foods for Human Nutrition* 41(3): 1991: 247-251

Seed protein concentrate (SPC) from 4 wild legumes (*Acacia concinna* DC., *Caesalpinia* DC., *Caesalpinia pulcherima* Sw., *Delonix regia* (Boj.) and *Uraria picta* Desv.) of North Eastern India was extracted and the extractabilities of total N, protein N and SPC determined. The composition, calorie value and *in vitro* enzymatic digestibility of SPCs was also analysed. The protein contents of seeds and SPC range from 23.25% (*U. picta*) to 39.50% (*D. regia*) and from 67.50% (*U. picta*) to 84.37% (*A. concinna*), respectively. Extractability of SPC ranges from 11.45% (*C. pulcherima*) to 16.25 (*A. concinna*), that of total N from 24.13% (*C. pulcherima*) to 43.33% (*A. concinna*) and protein N from 20.78% (*C. pulcherima*) to 40.62% (*A. concinna*). The calorie value of *C. pulcherima* and *U. picta* are higher due to higher lipid content. *A. concinna* SPC shows the best *in vitro*

digestibility (60.1%) with pepsin-trypsin enzyme system. Amino acid compositions of these SPCs reveal that these are rich in essential aminoacids except the S containing ones especially methionine. The antinutritional/toxic nature of SPCs need to be investigated before recommending these SPC's for food use. BV

1856

Bhat (RV) and Raghuram (TC). **Health and economic implications of imported toxic legumin.** *Current Science* 65(1): 1993: 12-13

Vicia sativa, alias blanche flour in Australia causes symptoms of lupinosis in cattle, pigs and even primates due to its inherent toxicity. Now it is being cultivated on large scale as a food crop in Australia and is exported to the Middle East Under different names for human consumption. Some quantity is also reexported to India. It is warned that use of *V. sativa* should be stopped to prevent health hazard. KAR

1857

Roy (MK) and Prasad (HH). **Gamma radiation in the control of important storage pests of three grain legumes.** *Journal of Food Science and Technology (India)* 30(4): 1993: 275-278

1 kGy of γ-radiation completely killed adult pulse beetle (*Callosobruchus chinensis* Linn) within a wk; controlled natural infestation of mung beans and gram by *C. chinensis* alone for 6 months; and also found sufficient for the management of weevilling in gram and lentil additionally infested with *C. chinensis*, rust red flour beetle (*Tribolium castaneum* Herbst) and lesser grain borer (*Rhizopertha dominica* Fabricius). *For 1 1/2 month storage of mung bean abd lentil, 0.25 kGy dose was adequate. SD*

Bengal gram

1858

Kamal Dhawan, Sarla Malhotra, Dahiya (BS) and Dharam Singh. **Seed protein fractions and amino acid composition in gram (*Cicer arietinum*).** *Plant Foods for Human Nutrition* 41(3): 1991: 225-232

Six chickpea strains were analysed for their protein content and various protein fractions. The protein content ranged from 20.9 - 25.27%. Albumin, globulin, prolamin and glutelin contents ranged from 8.39 - 12.31%; 53.44 - 60.29%; 3.12 - 6.89% and 19.38 - 24.40% respectively. Salt soluble protein (albumin + globulin) and globulins resolved into 19-23 bands whereas albumin proteins resolved into 30-34 bands. The mol. wts. of various polypeptides ranged from 10-91 kD. Amino acid analysis of total proteins revealed that glutamic acid was present in max. concn. followed by aspartic acid and arginine. Just like other pulse proteins, chick pea proteins were also found deficient in sulphur containing amino acids. AA

Cowpeas

1859

Ros (G) and Collins (JL). **Physico-chemical and nutritional properties of cowpeas (*Vigna unguiculata*) heated under pressure.** *Journal of the Science of Food and Agriculture* 58(3): 1992: 369-374

This investigation focusses the changes in colour, firmness, acidity, composition, trypsin inhibitor activity (TIA) and *in vitro* protein digestibility (IVPD) of cowpeas of 4 maturing stages that were heated in water at 34.5 kPa for varying times up to 40 min. Changes occurred more rapidly during the first 10 min of heating. The loss of greeness of immature cowpeas; rapid decrease in firmness during the first 5 min and more slowly thereafter, was observed. Fresh cowpeas were softened sufficiently for eating after 10 min at which time pH increased 0.65 units to pH 6.75 and acidity increased to 0.17%. Heat decreased the TIA by 81.7% after 5 min and 85.9% after 10 min. IVPD of the most mature, unheated cowpeas was 70.7% and increased to 83.4% after 10 min heating. BV

1860

Olaofe (O), Umar (YO) and Adediran (GO). **The effect of nematicides on the nutritive value and functional properties of sowpea seeds (*Vigna unguiculata* L. Walp).** *Food Chemistry* 46(4): 1993: 337-341

The effect of nematicides was studied on the proximate chemical, amino-acid and mineral compositions and protein solubility properties of cowpea seeds. The cowpea seeds produced with the application of nematicides showed crude protein content in the range of 23.6 - 27.3% compared to 23.3% of the control samples, but amino-acid composition was comparable between them. The predominant mineral K which varied from 1171-2753 mg/100 g sample did not show significant difference as the nematicides did not inhibit the uptake of minerals from the soil. The cowpea protein had min. solubility at pH 4.0 and its curves of the samples and control were similar. The industrial application of cowpea protein is discussed. SD

Green gram

1861

Sharma (MP) and Room Singh. **Effect of phosphorus and sulphur application on yield and quality of greengram (*Phaseolus radiatus*).** *Indian Journal of Agricultural Sciences* 63(8): 1993: 507-508

Green gram was cultivated applying P at 25, 50 and 75 kg/ha and S at 20, 40 and 60 kg/ha during the summer season of 1989 and 1990 at Kumarganj, Faziabad, Uttar Pradesh, India. Grain yield increased significantly with increase in P level up to 50 kg/ha and S level up to 40 kg/ha in both the yr. Protein content increased up to 50 kg/ha P level (23.67%) and up to 60 kg/ha S level (25.14%). Methionine and cystine contents increased significantly with higher levels of S but P showed opposite effect on these amino acids. KAR

Locust beans

1862

Oje (K). **Some physical properties of relevance to dehulling and seed processing.** *Journal of Food Science and Technology (India)* 30(4): 1993: 253-255

Locust bean pods had major diam. from 76-277 as against 8-12 mm for seeds. Seed thickness ranged from 5.75 - 7 mm. Average sphericity of 67 and roundness of 65 are the characteristics that allow for some roding of the seeds and sliding on its flat surface. Pod floated in water but the seed did not. SD

Lupins

1863

Trugo (LC), Farah (A) and Trugo (NMF). **Germination and debittering lupin seeds reduce α-galactoside and intestinal carbohydrate fermentation in humans.** *Journal of Food Science* 58(3): 1993: 627-630

The results obtained with the breath-hydrogen tests showed that max. changes in hydrogen concn. in the expired air from the 13 subjects were attained at 60 to 180 min when lactose was tested. When untreated *Lupinus albus* and *L. angustifolius* were tested. They varied from 300 to 480 min. Max. changes in breath-hydrogen concn. obtained with lactulose sol. The rice pudding, and the untreated, germinated and debittered lupins were compared. The responses to lactulose (positive control) ranged from 30 to 120 p.p.m. All subjects showed max. changes in hydrogen concn. below 15 p.p.m. in response to the rice pudding. Results paralleled the decrease in α-galactoside contents of germinated and debittered samples which showed over 90% reduction. Debittering was more efficient to reduced fermentation in human colon. SRA

Red beans

1864

Avin (D), Kim (C-H) and Maga (JA). **Effect of extrusion variables on the physical characteristics of red bean (*Phaseolus vulgaris*) flour exrtrudates.** *Journal of Food Processing Preservation* 16(5): 1992: 327-335

Red bean flours containing either low or high moisture were extruded at dough temp. of either 90, 110 or 124°C at screw speeds of either 80, 120 or 160 r.p.m. in a Brabender Model PL-V500 single screw lab. extruder. Resulting extruder torque and extrudate yield, expansion, density, breaking strength, and water absorption and solubility indices were measured. Moisture significantly (P less than or equal to 0.01) influenced torque, expansion, while temp. significantly inflenced torque, expansion, breaking strength and water absorption index. Screw r.p.m. only influenced yield. AA

OILSEEDS AND NUTS

1865

Kulkarni (AS), Khotpal (RR) and Bhakare (HA). **Studies on glycolipids of kenaf, english walnut, myrobalan and Manila tamarind seeds of the Vidarbha region (India).** *Journal of the American Oil Chemist's Society* 68(11): 1991: 891-893

Studies on the glycolipid compositions of Kenaf, English walnut, Myrobalan and Manila tamarind seeds found in the Vidarbha region of Central India have been carried out by silicic acid column chromatography and thin-layer chromatography (TLC). The total glycolipids have been separated into individual components such as monogalactosyldiglycerides 20-28%, digalactosyldiglycerides 40-41%, sterylgalactosides 15-18%, acylated sterylgalactosides 8-15% and unidentified components 0.8-2%. The fatty acid composition of total and component glycolipids as determined by GLC showed the predominant fatty acids to be palmitic, stearic and oleic acids. Sugar in the component glycolipids was found to be exclusively galatose. AA

Coconuts

1866

Jayalekshmy (A), Narayanan (CS) and Mathew (AG). **Identification of volatile flavour compounds in roasted coconut.** *Journal of the American Oil Chemist's Society* 68(11): 1991: 873-880

Heating of coconut leads to browning and development of fine roasted flavour. Flavour studies were carried out with control and heated samples of coconut. GC and GC/MS analyses of the basic, neutral and acid fractions of flavour, isolated by hydrodistillation and selective extraction, showed the presence of pyrazines and other heterocyclic compounds in heated samples. These compounds contribute to the overall roasted flavour. Twenty pyrazines were identified in roasted coconut, which included pyrazine, methyl pyrazine, dimethyl pyrazines, ethyl methyl pyrazines, vinyl pyrazine and isopropyl pyrazine. Pyrazine content increased with temp. In addition to these compounds, δ-lactones, esters, ketones and fatty acids were present in control and heated samples of coconut. AA

Cottonseeds

1867

Conkerton (EJ), Schneider (GR), Bland (JM), Marshall (HFJr) and Goynes (WRJr). **Microwave heating to prevent deterioration of cottonseed during storage.** *Journal of the American Oil Chemist's Society* 68(11): 1991: 834-839

Fuzzy cottonseed samples of 14.5% moisture and < 1.0% free fatty acids (FFA) contents heated in a conventional, home-style microwave oven at 700W and 2450 MHz for intervals up to 2.0 min. The 2.0-min treatment reduced the moisture content to 13.1%. Examination of the seed immediately after microwave heating (MWH) indicated no differences in the proteins or in the quality or quantity of the cotton linters as compared with unheated seed. Neither the oil content of the seed nor the quality of the oil were affected by the microwave treatment. After 9 wks of storage at 50°C, the unheated seed had a FFA content of > 3.0% while the FFA content of the 2.0-min microwave-heated seed remained < 1.0%. During this storage period there was significant deterioration of the protein quality of the unheated seed. The 2.0-min MWH treatment, however, maintained the integrity of the protein during storage. AA

Groundnuts

1868

Noomhorm (A), Premakumar (K) and Ting (CC). **Accelerated drying of groundnuts in batch rotary drier.** *ASEAN Food Journal* 7(3): 1992: 159-160

Drying duration and quality indexes of groundnuts dried by condution and by sun drying were compared. Sun drying required 58 h to dry groundnuts from 49 to 10% moisture content and conduction drying was 7 to 10 fold faster at 70°C with 3 min/pass and 15 min tempering time. Quality indexes of groundnuts dried at 70°C were comparable with sundried groundnuts, but quality of groundnuts dried at higher conduction temp. was inferior. The results indicate that, if kernel temp. can be maintained at 35 to 37.5°C during conduction drying, good quality dried groundnuts can be produced, with significant reduction in drying time. SRA

1869

Misra (JB), Yadav (SK) and Chauhan (S). **Inverse relationship between oil content and specific gravity of groundnut kernels.** *Journal of the Science of Food and Agriculture* 61(2): 1993: 231-234

Thirty-two samples of groundnut kernels were analysed for oil content by the standard Soxhlet extraction procedure. The oil content ranged between 425.6 and 549.5 g kg^{-1}. The sp. gr. of groundnut kernels was determined both for the whole kernels and the split kernels (cotyledons with testa). The sp. gr. of whole kernels varied between 0.9358 and 1.0730 while that of split kernels between 1.0547 and 1.1227. A highly significant correlation (r = -0.9459) was found between oil content and sp. gr. of split kernels. It should, therefore, be possible to predict the oil content of the groundnut samples on the basis of sp. gr. of split kernels. AA

Rapeseeds

1870

Zhao (F), Evans (EJ), Bilsborrow (PE), Schnug (E) and Syers (JK). **Correction for protein content in the determination of the glucosinolate content of rapeseed by the X-RF method.** *Journal of the Science of Food and Agriculture* 58(3): 1992: 431-433

Thirty six rapeseed samples from a factorial designed nitrogen and sulphur trial were analysed for total glucosinolate content by the X-ray fluorescence (X-RF) and HPLC methods and for protein content by the Kjeldhal method. Protein content varied from 16.0 to 22.6%. Correction for seed protein content in the calculation of glucosinolate content by X-RF significantly improved the agreement between the 2 methods of glucosinolate analysis. The following equation was

used in the correction: Y = 14.99 [S)mg g^{-1}) - protein %/7.5]. AA

Rapeseed protein

1871
Badshah (A), Aurangzeb, Sattar (A) and Bibi (N). **Effect of irradiation and other processing methods on *in vitro* digestibility of rapeseed protein.** *Journal of the Science of Food and Agriculture* 61(2): 1993: 273-275

Effect of irradiation (1 kGy), autoclaving (121°C at 103.5 kPa for 5, 10, 15, 20, 25 and 30 min), dry heating (121°C for 5, 10, 15, 20, 25, 30 and 60 min), sprouting (36 h) and their combination on *in vitro* digestibility of rapeseed protein was studied. Digestibility was significannatly affected by processing methods ($P < 0.05$). Digestibility of untreated rapeseed protein was 85.7%. Irradiation alone and irradiation plus dry heating showed no effect on the digestibility, while irradiation plus autoclaving markedly improved (88.9%) the digestibility. The digestibility was influenced by the time of autoclaving and dry heating. Max. value for *in vitro* digestibility was recorded for 60 min of dry heating (91.8%). Sprouting of rapeseed exhibited a significant decrease (82.8%) in the digestibility. AA

Soybeans

1872
Hanras (C) and Perrin (JL). **Gram-scale preparative HPLC of phospholipids from soybean lecithins.** *Journal of the American Oil Chemist's Society* 68(11): 1991: 804-808

A preparative procedure has been developed to isolate gram quantities of phospholipid classes from soybean lecithins. Various steps taken to accomplish the isolation are described - an analytical method with silica column and light scattering detector, alcohol fractionation of deoiled lecithins, and columns with increasing internal diam. but packed with the same stationary phase. The loading study showed that it was possible to inject 20 mg on a 100 x 8 mm Radial μPorasil column. The separation was scaled up to a 25-mm i.d. column and finally to a 50-mm i.d. column. With the larger column, 2.1 g of phospholipids were separated. The collected fractions (phosphatidylethanolamine, phosphatidylinositol, phosphatidic acid and phosphatidylcholine) were of high purity (> 99%). The solvent consumption was 7.2 L (separation and column equilibration), and a min. of 10 g of polar lipids can be separated daily. AA

Soy products

Soy flour

1873
Pallavi Sharma, Usha (MS), Pratima Awasthi and Chauhan (GS). **Defatted soy flour substitution in some traditional foods. 1: Effect on sensory characteristics.** *Beverage and Food World* 20(3): 1993: 7-10

Chickpea flour and wheat flour were substituted by defatted soyflour (DSF) in three snacks, viz., Murukku, Nankhatai and Mysore pak. The sensory properties of the products were evaluated. The results show that DSF can replace chickpea flour in murukku and Mysore pak without affecting their acceptability adversely. Alongwith the DSF - substituted murukus were harder than besan murukkus and texture of DSF-incorporated Mysore pak was less short. Nankhatais with 15% incorporation of defatted soyflour were similar to the control, but at 25% level of incorporation they differed significantly from the control. Consumer acceptance tests returned 82.8% positive results and indicate that the snacks were well-liked. AA

Sunflowers

1874
Vijayalakshmi (M) and Rao (AS). **Effect of seed-borne fungi on quality of sunflower (*Helianthus annus*) oil.** *Indian Journal of Agricultural Sciences* 63(8): 1993: 529-531

Nineteen fungi were isolated from the sunflower seeds during development or in storage. The seeds, after harvest were stored either in gunny bags or at RH's of 66 to 95% for 12 wk. All the field fungi showed a decrease during storage. But *Aspergillus* spp. and *Penicillium citrinum* increased during storage at higher RH's, but not in gunny bag stored samples. The refractive index of extracted oil infected by different fungi did not vary much, but the free fatty acid content varied much, max. being found in those oil obtained from seeds infected by *Macrophomina phaseolina* followed by *Alternaria alternata* and *Aspergillus flavus*. KAR

TUBERS AND VEGETABLES

Cassava

1875
Obidoa (O) and Obasi (SC). **Coumarin compounds in cassava diets: Two health implications of**

scopoletin in *gari*. *Plant Foods for Human Nutrition* 41(3): 1991: 283-289

Scopoletin (6-methyoxy-7-hydroxy coumarin) the fluorescent "aflatoxin-like" compound found in cassava products (*gari*, cassava flour) was not altered by post-processing treatments such as sun-drying, refrigeration and storage. Experimental evidences strongly suggest a toxicological and/or pharmacological role for scopoletin and the tropical ataxic neuropathy observed among people who subsist on cassava based diets may be due to toxicological manifestation of the biochemical effects of scopoletin in the neuromuscular junction. BV

Sugar beet

1876

Auffret (A), Barry (J-L) and Thibault (J-F). **Effect of chemical treatments of sugar beet fibre on their physico-chemical properties and on their *in vitro* fermentation.** *Journal of the Science of Food and Agriculture* 61(2): 1993: 195-203

Chemically treated and dried sugar beet fibres were fermented *in vitro* in oder to study the effects of chemical and physico-chemical parameters of dietary fibre on the their colonic fermentation. Sugar beet fibre was treated with dilute alkali, removing mainly acetyl and methyl ester groups, and/or with dilute acids eliminating arabinose, galactose and certain uronic acid residues. The chemical treatments led to an increase in the hydration properties and fermentability by improvement of the accessibility of the remaining polysaccharides. However, if the chemically treated fibres were dried under harsh conditions (100°C), their hydration properties and their fermentability were limited probably because of structural collapse of the fibre matrix. Whatever the condition for chemical treatments and drying of the sugar beet fibres, it was possible to predict their fermentability from the water-binding capacity. Because of the relationship between the physiological effects of dietary fibres and the extent to which they are fermented, this result underlines the importance of the physico-chemical characterisation of the fibre in order to acquire a better knowledge of their physiological effects. AA

Potatoes

1877

Dignos (RL), Cerna (PF) and Truong (VD). **β-carotene content of sweet potato and its processed products.** *ASEAN Food Journal* 7(3): 1992: 163-166

This paper reports the comparative values of β-carotene contents in the fresh roots of three sweet potato cvs (VSP-1, VSP-4 and Karingkit) and effects of processing on the β-carotene content in sweet potato processed products including fruity products such as dried sweet-sour, sweet potato, sweet potato (SP) catsup and SP jam with taste and appearamce similar to those made of fruits. The flesh colours of the sweet potato were light yellow (Karingkit), golden yellow (VSP-4) and orange (VSP-4). On the fresh wt. basis, the fresh roots of VSP-1 had the highest β-carotene content of 9.9 mg/100 g and Karingkit had the lowest (0.3 mg/100 g). The boiled roots of VSP-1 had the highest β-carotene content. The loss of β-carotene (10-23%) for these 3 cv was comparable to av. 15% loss for carrots and other vegetables after boiling. A loss of 20.5% beta-carotene was noticed in durum drying of sweet potato puree. Sun drying resulted in 38% loss of β-carotene. A significant difference ($P < 0.01$) in vitamin A content of the various dried sweetened products was noticed. Vitamin A content was SP jam was higher (P less than or equal to 0.01) than that of mango, orange and pineapple marmalade. SP catsup had about 90 times higher vitamin A content than banana catsup. SRA

Vegetables

1878

Nahar (N), Mosihuzzaman (M) and Dey (SK). **Analysis of free sugar and dietary fibre of some vegetables of Bangladesh.** *Food Chemistry* 46(4): 1993: 397-400

Free sugar and dietary fibre (DF) contents and compositions of elongated bean, lady's finger, papaya, bitter gaurd, brinjal, water gaurd and green banana were assessed. Total free sugar ranged from 0.2 - 1.8% and DF 3.4 - 6.1%. Elongated bean had the best combination of low free sugar and high DF. Glucose was the main constituent of total polysaccharide and galactose the major components of soluble DF. SD

Cucumber

1879

Garg (N), Tandon (DK) and Kalra (SK). **Lactic acid fermentation of cucumber for pickling.** *Beverage and Food World* 20(3): 1993: 17-18

Leafy vegetables

Asparagus

1880

McGlynn (WG), Davis (DR) and Honarmand (F). **Gluconic acid influences texture and colour of canned asparagus.** *Journal of Food Science* 58(3): 1993; 614-615

The colour and texture of canned asparagus spears were measured using a shear-press and a Gardner colour difference meter. Addition of gluconic acid to brine at 1% pH of canned asparagus tissue to a safe level of 4.6 or below within 24 h. Tissue pH dropped during 5 month storage. Notable changes in colour occurred during storage. By the end of storage, pasteurized acidified asparagus was darker than retorted acidified spears but lighter than retorted non-acidified spears. In addition, pasteurized acidified asparagus was less green and more yellow than retorted asparagus. Pasteurized acidified asparagus was much firmer (> 2X) than retorted asparagus both with and without added acid. No significant changes occurred in firmness during storage. SRA

Cabbages

1881

OMary (MB), Testin (RF), Barefoot (SF) and Rushing (JW). **Packaging effects on growth of *Listeria innocua* in shredded cabbage.** *Journal of Food Science* 58(3): 1993; 623-626

Freshly shredded white cabbage was treated with citric acid and sodium erythorbate, inoculated with *L. innocua* (in lieu of *L. monocytogenes*) and packed in 230 g lots in 4 types of retail bags with 5.6, 1500, 4000, and 6000 cc $O_2/m^2/24$ h oxygen transmission rates (OTR) and stored at 11°C for 21 days. *L. innocua* decreased ($P < 0.05$) on day 14. Aerobic plate count increased at 14 days storage. On day 21, cabbage in all films showed an increase in *L. innocua* beyond the initial inoculum. Study suggested that recovery of *L. innocua* and theoretically, that of *L. monocytogenes* would be less in shredded cabbage stored at 11°C packaged in films with OTRS > 6000. SRA

Parsley

1882

Yamauchi (N) and Watada (AE). **Pigment changes in parsley leaves during storage in controlled or ethylene containing atmosphere.** *Journal of Food Science* 58(3): 1993; 616-618

Pigments were monitored in parsley leaves stored in air, air + 10 p.p.m. C_2H_4, or 10% O_2 + 10% CO_2 controlled atm. (CA). Chlorophylls a and b, as determined with HPLC, decreased sharply in leaves held in air or air + 10 p.p.m. C_2H_4. The decrease was less in leaves held in 10% O_2 and 10% CO_2 CA. The oxidized product of chlorophyll a, 10-hydroxychlorophyll a, did not accumulate and chlorophyllide accumulated minimally. Xanthophylls decreased but new pigments, suspected to be esterified xanthophylls, formed with yellowing of leaves. Neither the pathway of Chl degradation or xanthophyll products were altered by C_2H_4 or CA. AA

FRUITS

1883

Charanjit Kaur and Khurdiya (DS). **Improvement in the quality of fruit nectar.** *Beverage and Food World* 20(3): 1993; 15-16, 18

Nectar of pineapple, apple, plum and orange were blended with mango pulp in the ratio of 0:4, 3:1, 1:1, 1:3 amd 4:0 respectively. Overall acceptability was highest for the blended nectar of mango with pinapple, apple, orange and plum ratios 2:2, 3:1, 3:1 amd 1:3 respectively. Bv

1884

Sethi (V) and Dadlani (NK). **The art of making various products from the lovely flowers: The rose.** *Beverage and Food World* 20(6): 1993; 25-26

Gives briefly the preparation of rose essence, glukand, rose hip juice and syrup and rose hip jam. BV

1885

Lehmann (D), Dietrich (A), Schmidt (S), Dietrich (H) and Mosandl (A). **γ(δ)-Lactones and (E)-α(β)-ionone from various fruits and their processed products.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 196(3): 1993; 207-213 (De)

By means of enantioselective multidimensional GC (column combination OV 1701/octakis (3-O-butyryl-2,6-di-O-pentyl)-γ-cyclodextrin the simultaneous stereodifferentiation of the γ- and δ-lactones C_6 - C_{12} was applied to determine the enantiomeric ratios in different fruits and their processed products. In addition *E)-α-ionone was stereodifferentiated in raspberries and products from raspberries. The analysed chiral compounds have characteristics and fruit-specific enantiomeric ratios, which are irrespective of the food processing applied. AA

Apricots

1886

Sharma (TR), Sekhon (KS) and Saini (SPS). **Colour changes during drying of apricot.** *Journal of Food Science and Technology (India)* 30(4): 1993: 306-308

Effect of pretreatments viz, heat application, chemical dipping and sulphur fumigation, during drying of apricots to prevent discolouration was investigated. Max. yield was recorded in control followed by steam-blanched fruits. Lye-peeled apricots retained lower moisture than steam-blanched fruits. Max. and min. brownings were observed in untreated samples and the fruits subjected to sulphur fumigation, respectively. Non-enzymatic browning showed statistically significant differences among var. and treatments. 'Chuli' - a wild variety had the max. browning, while 'Suffaida' the least. Among various pretreatments, sulphur fumigation and lye-peeling were more effective than the rest, while 'Kaisha' variety was rated as the best. AA

Bananas

1887

Usha (V), Vijayammal (PL) and Kurup (PA). **Alteration in carbonydrate components of glycoproteins of rat liver by feeding dietary fibre from unripe banana.** *Journal of Food Science and Technology (India)* 30(4): 1993: 286-288

Feeding isolated dietary fibre from unripe banana to rats has been found to have significant effect on the carbohydrate components of glycoproteins in the liver. Many of the carbohydrate components of glycoproteins showed increases in rats fed fibres due to resultant decrease in the activity of glycohydrolases. *in vitro* inhibition of glycohydrolase activity by bile acids is known in most cases and thus, explains the *in vivo* effect observed in the present studies. AA

Cherries

1888

Alonso (J), Canet (W) and Rodriquez (MT). **Effect of various thermal pre-treatments on the texture of frozen cherries (*Prunus avium* L.). Related enzyme activities.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 196(3): 1993: 214-218

The effect produced on the texture of cherries by heating at 50, 60 and 70°C for 3, 6, 9 and 12 min before freezing followed by 3 and 6 months of frozen storage was studied. Variations in cell-wall enzyme activity were also analysed. To this end, objective measurements were carried out on the firmness of the cherries, by means of mechanical penetration, shear and Kramer Shear Cell tests. Pectinesterase and polygalacturonase activity were also measured. Correlations were established between the mechanical test results and pectinesterase activity in cherries subjected to different treatments. Significant correlations were found between this activity and the final firmness of the frozen fruit. Low-temp. heating (70°C) prior of freezing significantly improves the final texture of the product. AA

Karwand

1889

Chandra Iyer (M) and Dubash (PJ). **Anthocyanin of karwand (*Carissa carandas*) and studies on its stability in model systems.** *Journal of Food Science and Technology (India)* 30(4): 1993: 246-248

Anthocyanin from Karwand (*Carsissa caranda*) is characterized, and its stability is determined in model systems. Based on the chromatographic data and spectral studies, the pigment is identified as cyanidin - 3 - rhamnoglucoside. The data on the stability of the pigments in two model systems showed progressive loss of anthocyanin. The loss was higher at 30°C than at 5°C. A potential exists for the use of karwand anthocyanin as a natural colouring agent for products requiring milder processing treatment and low temp. storage. AA

Mangoes

1890

Azizi (A) and Ranganna (S). **Spoilage organisms of canned acidified mango pulp and their relevance to thermal processing of acid foods.** *Journal of Food Science and Technology (India)* 30(4): 1993: 241-245

Swelling due to gas formation in commercially canned 'Alphonso' mango pulp(pH 4.3) was caused by *Bacillus lichenlformis* (having thermal resistance i.e., D_{100} = 1.25 min at pH 4.2 and D_{100} = 3.12 min at pH 7.0) and *Clostridium sporogenes* (D_{100} =6.8 min at pH 4.5 and $D_{121.1}$ = 0.51 min at pH 7.0). The metabiosis of the former increased the pH, thereby creating conditions favourable for the growth of the latter. These findings indicate that products having a pH higher than 4.0, but lower than 4.6, should be given thermal process, adequate to destroy *B. lichenlformis* except when *B. coaguians* spoilage is likely to occur. AA

1891

Mir (MA) and Nath (N). **Storage changes in fortified mango bars.** *Journal of Food Science and Technology (India)* 30(4): 1993; 279-282

Three types of mango bars (plain mango, mango-desiccated coconut powder and mango-soy protein concentrate bars) stored for 90 days at -18°C, 27 plus or minus 3°C (65% RH) and 38 plus or minus 1°C (92% RH) indicated significant increase in moisture, acidity and reducing sugars; decrease in total and free SO_2, total carotenoids and β-carotene; and increase in non-enzymatic browning. Losses of carotenoids and non-enzymatic browning were more in unsulphited bars. Storage also decreased the overall acceptability and texture. The changes were min. in mango bars stored at -18°C. SD

Oranges

1892

Faheid (SMM) and Murad (HA). **Utilization of polygalacturonase from *Myrothecium verrucaria* for maceration of orange pulp. 1. Optimization of maceration conditions for increasing the recovered pulp-wash and soluble solids.** *Deutsche Lebensmittel-Rundschau* 88(4): 1992: 117-119

Studies were carried out to investigate the possibility of a utilization of polygalacturonase preparation from *Myrothecium verrucaria* CBS 28846 for maceration of orange pulp to increase the yield of pulp wash and soluble solid recovery. Marked increase in orange pulp-wash recovery (34%) and total soluble soiids recovery (8%) were obtained. On the other hand the optimum enzyme concn. was 16 mg protein (140 unit per 100 g orange puip. The optimum maceration time was 60 min and the optimum pH was 4.8. The reducing and non reducing sugars and vitamine (C) contents of orange pulp-washes produced with or without enzyme treatment were evaluated and compared with orange juice. AA

1893

Murad (HA), Faheid (SMM) and Fadel (MA). **Utilization of polygalacturonase from *Myrothecium verrucaria* for maceration of orange pulp. 2. Reduction of pulp-wwash viscosity and properties of concentrated washes.** *Deutsche Lebensmittel-Rundschau* 88(4): 1992: 119-121

Effect of enzymatic maceration of orange pulp washes by using polygalacturonase preparation from *Myrothecium verncaria*, CBS 28846, on the viscosity reduction of orange pulp-washes to facilate concn. process to higher °Brix were studied. High viscosity of pulp-wash liquid was found to be a deterrent during the concn. process by evaporation. Enzyme-treated washes were concentrated up to 32.5°Brix, which correspond to relative viscosity 2960 Centipoises; however nontreated washes were concentrated up to 26°Brix. The final very slow rates of concn., under our experimetnal condition, made it impossible to increase the concn. over 26°Brix for nontreated washes. The chemical composition of orange pulp washes with or without enzyme treatment, before and after concn. process was evaluated in respect to their content of vitamin C, reducing and non-reducing sugars, total sugars and pectin fractions. AA

Peaches

1894

Wang (T), Gonzalez (AR), Gbur (EE) and Aselage (JM). **Organic acid changes during ripening of processing peaches.** *Journal of Food Science* 58(3): 1993; 631-632

Major organic acids (malic, citric and quinic) and their changes during ripening of clingstone peach (*Prunus persica* L. Batsch) fruit cvs were studied by HPLC. Study indicated that quinic acid was found at concn. slightly lower than citric in cv 'Babygold 5' and 'Babygold 7'. In 'Cresthaven' cv, the citric acid and malic acids concn. were similar and quinic acid was present in lower level. SRA

CONFECTIONERY, STARCH AND SUGAR

Starches

1895

Padua (GW). **Proton NMR and dielectric measurements on sucrose filled agar gels and starch pastes.** *Journal of Food Science* 58(3): 1993: 603-604, 626

Low-field proton NMR and high-frequency dielectric measurements were performed on sucrose-filled agar gels of 0 to 1.2 g sucrose/g water and starch pastes of concn. between 0.2 and 1 g starch/g water. The dielectric constant decreased linearly with increasing concn. for both. The dielectric loss of sucrose-filled agar gels showed two regions, first increasing and then decreasing with concn. The dielectric loss data for starch pastes showed a constant value close to that of pure water throughout the concn. range. Dielectric data were related to hydration models derived from proton NMR measurements. AA

1896

Saura-Calixto (F), Goni (I), Bravo (L) and Manas (E). **Resistant starch in foods: Modified method for dietary fiber residues.** *Journal of Food Science* 58(3): 1993: 642-643

A modified procedure based on Siljestrom and ASP method was developed for measuring resistant starch (RS). RS was determined in fiber residues in simplified and accurate way. This procedure could be used to quantify RS in foods without determining fiber. SRA

Sugar

1897

Dhillon (NS), Brar (BS) and Vig (AC). **Effect of farm yard manure, nitrogen, phosphorus and potassium application on cane yield and sugar content of sugarcane (cv. CoJ 64).** *Indian Sugar* 43(3): 1993: 171-174

Sugar content in cane juice increased significantly from 14.1 to 17.2% with farm yard manure and from 11.1 to 16.9% with N fertilizer. Application of P and K had no effect on sugar content of the juice. SRA

1898

Singh (M). **Modern techniques and future trends in the pan boiling and crystallisation in sugar industry.** *Indian Sugar* 43(3): 1993: 153-165

Article covers objectives of crystallisation: changes in the crystallisation operation: process of boiling in Indian sugar industry: approach to system design, continuous pans: advantages of the continuous pans: designs, types and operational data: industrial installation and results: continuous pans in India: export quality sugar - continuous pan boiling: crystallisation by cooling: continuous cooling crystallisers for B Massecuites and cooling of A Massecuite. SRA

BAKERY PRODUCTS

1899

Chavan (JK), Shinde (VS) and Kadam (SS). **Utilization of expeller pressed partially defatted peanut cake meal in the preparation of bakery products.** *Plant Foods for Human Nutrition* 41(3): 1991: 253-259

Expeller pressed partially defatted peanut cake meal (PCM) obtained from skin-free kernels was mixed with commercial wheat flour (60% extraction) at 10, 20 and 30% w/w to obtain composite flours (CF). The CF was used in the preparation of bread, sweet buns, cupcakes and yeast- raised doughnuts. The mixing of defatted PCM with wheat flour decreased the loaf vol., specific vol. and moisture loss during storage, but increased the fresh wt. of water holding capacity and protein content of bakery products. The supplementation of wheat flour with 10% PCM increased the protein content from 9.3 - 12.5% in breads, from 7.5 - 10.0% in sweet buns, from 6.1 - 7.2% in cupcakes while from 9.3 - 11.0% in doughnuts. The mixing of defatted PCM reduced the size, increased browning of crust colour, caused grainy crumb and imparted peanut flavour to the products. The intensity of these effects increased with increase in the level of supplementation of PCM. The products containing 10% PCM were found to be acceptable. BV

1900

Lorenz (K) and Coulter (L). **Quinoa flour in baked products.** *Plant Foods for Human Nutrition* 41(3): 1991: 213-223

The performance of quinoa-wheat flour blends (5/95, 10/90, 20/80, 30/70) were evaluated in breads, cakes and cookies. Breads baked with 5% and 10% quinoa flour (QF) were of good quality. Loaf vol. decreased, crumb grain became more open and the texture slightly harsh at higher usage levels of QF. A bitter aftertaste was noted at the 30% level. Cake quality was acceptable with 5% and 10% of QF. Cake grain became more open and the texture less silky as the level of QF substitution increased. Cake taste improved with either 5% or 10% QF in the blend. Cookie spread and top grain scores decreased with increasing levels of QF blended with high-spread cookie flour. Flavour improved up to 20% QF in the blend. Cookie spread and cookie appearance was improved with a QF/low-spread flour blend by using 2% lecithin. AA

1901

Haridas Roa (P). **Health bakery products.** *Indian Miller* 23(6): 1993: 9-18

Information on health foods available in literature and also based on the work carried out at CFTRI, Mysore, India, covering vitaminized bread, whole wheat/brown bread, high protein bakery products (bread, biscuits), high fibre bakery products (mechanism of action of dietary fibre, bread, biscuits, gum breads), diabetic bakery products (sugar free bread, carbohydrate reduced bread, use of sweeteners, natural sweeteners, aspartame, acesulfame-K, new sweeteners of 1990-alitame, sucralose), low salt bakery products, bread without gluten and low-calorie products, bread without gluten and low-calorie products using fat substitutes is presented. SRA

1902

Ryu (GH), Neumann (PE) and Walker (CE). **Pasting of wheat flour extrudates containing conventional baking ingredients.** *Journal of Food Science* 58(3); 1993; 567-573, 598

The effects of 6 conventional baking ingredients (sucrose, non-fat dry milk, dry egg, shortening, glyceryl monostearate (GMS) and sodium bicarbonate) on pasting properties of wheat flour in extrusions using the Rapid Visco-Analyser (RVA) were determined. Sucrose, shortening and GMS affected pasting properties significantly. GMS had the most effect on peak times and viscosity values. SRA

1903

Dorko (CL) and Penfield (MP). **Melt point of encapsulated sodium bicarbonates: Effect on refrigerated batter and muffins baked in conventional and microwave ovens.** *Journal of Food Science* 58(3); 1993; 574-578

Muffin batter was prepared with encapsulated sodium bicarbonates (ESB) of 3 encapsulated melt points (EMP) (43, 52 and 60°C) and tested after 1 day (0 WK) and 1, 2, 3 and 4 wk. Batter pH increased from 0 wk to 1 wk. Specific vol. of microwave-baked muffins containing EMP 43 or 60°C increased with storage and were highest; the EMP 52°C microwave baked muffins had the lowest specific vol. Conventionally baked muffins were darker than microwave baked muffins. SRA

1904

Dorko (CL) and Penfield (MP). **Particle size of encapsulated sodium bicarbonates: Effect on refrigerated batter and muffins baked in conventional and microwave ovens.** *Journal of Food Science* 58(3); 1993; 579-582

Batter containing encapsulated sodium bicarbonate (ESB), differing in particle size (ESB1 or powdered, ESB5 or granular) was stored in glass jars at 0-1°C and tested after 1 day and 1,2,3 and 4 wk. Effect of $NaHCO_3$, particle size, batter storage time, and baking method on batter and muffin quality were varied and complex. Batter pH increased from 1 day to 1 wk. Microwave-baked muffins were flatter than conventionally baked muffins. All baked muffins with ESB1 had greater specific vol. than those with ESB5. Conventionally baked muffins had lower Hunter L values than microwave-baked regardless of particle size which agreed with sensory evaluation. SRA

Bread

1905

Addo (K), Burton (D), Stuart (MR), Burton (HR) and Hildebrand (DF). **Soybean flour lipoxygenase isozyme mutant effects on bread dough volatiles.** *Journal of Food Science* 58(3); 1993; 583-585, 608

The effects of different defatting treatments on lipoxygenase activities of soy mutant isolines was examined and the isozyme(s) primarily responsible for production of off-flavours in bread dough was determined. Defatting resulted in a significant loss of lipoxygenase 2 activity with little effect on lipoxygenases 1 or 3. Addition of full fat soy flour from mutant isolines indicated that as with soybean homogenates, lipoxygenase 2 is mostly responsible for undesirable aroma compounds. Much higher levels of volatile alcohols were found in soy flour amended bread dough than in soy flour homogenates alone. SRA

1906

Jyothsna Rao (S), Prasad (MS) and Venkateswara Rao (G). **Effect of xanthan gum on the quality of bread.** *Journal of Food Science and Technology (India)* 30(4); 1993; 265-268

Xanthan gum, an exocellular polysaccharide produced by obligately aerobic *Xanthomonas campestris* was incorporated in wheat flour at 0.1 - 0.5 levels. 0.3% level improved the water absorption from 59.8 to 6.4%, dough stability from 6.0 to 10.0 min., dough strength from 136.5 to 150.0 cm^2 and overall bread making quality, specifically crumb softness. The yield of bread also increased by 3.5%. SD

Chapathies

1907

Syed (HD), Rathi (SD), More (DR) and Yasmin (HZ). **Studies on improving the chapati quality.** *Indian Miller* 23(1); 1992; 9-16

Plain chapatis were prepared using whole meal and *atta* of wheat var. HD-2189, N-59 and CC-464. N-59 gave superior quality chapati than HD-2189 and CC-464. Chapatis prepared from acidified (lactic acid 0.5%) and or yeasted doughs rested for 2-4 h showed considerable improvement in colour, texture and shelf-life. SRA

Cookies

1908

Prost (C), Lee (CY), Giampaoli (P) and Richard (H). **Extraction of cookie aroma compounds from**

aqueous and dough model system. *Journal of Food Science* 58(3): 1993: 586-588, 608

Seventeen aroma compounds used in cookie preparation were analysed using 2 extraction procedures (simultaneous distillation - extraction (SDE) and direct extraction by solvents) using a model system. Aroma compounds with low polarity were more distillable and showed high yield with SDE method. Four important aroma compounds, vanillin, 4-(4-hydroxyphenyl)-2-butanone, maltol and γ-butyrolactone were difficult to extract. However, direct extraction gave good results for aroma compounds with relatively high mol. wt. Since aroma compounds added to cookies were in wide range of chemical classes, it is difficult to recommend a single extraction method for all compounds. The two methods were complementary and could be used for flavour studies in cookies. SRA

MILK AND DAIRY PRODUCTS

1909

Agarwala (SP), Sawhney (IK) and Bikram Kumar. **Development of cream separating attachment for food processors and mixies.** *Indian Dairyman* 45(3): 1993: 113-114

A cream separation attachment for food processors and mixies was developed and evaluated for its performance at Dairy Engineering Division, National Dairy Research Institute, Karnal, India. For better cream separation, two circulations of milk were found essential. Cream of 40% richness was obtained and milk fat in skim milk varied between 0.5 to 1%. Four l of milk can be separated in 10 min. The unit is noiseless, vibration free and requires only one person to handle it. GS

1910

Graham (HD). **Mg^{2+} selectively isolates gellan gum from dairy products.** *Journal of Food Science* 58(3): 1993: 539-543, 566

Selective isolation of gellan gum from papain digest dairy products using 5% $MgSO_4$, and its specific colorimetric detn. using the H_2SO_4 - thiourea - cysteine hydrochloride reagent was studied. Recovery from chocolate milk, yoghurt, evaporated milk, ice cream, cream cheese, process cheese spread, flan and blue cheese dressing ranged from 76-95%. Xanthan gum, carrageenan, alginate, pectin starch and other common hydrocolloids did not interfere when added at the same levels as gellan gum. SRA

1911

Woollard (DC) and Indyk (HE). **The determination and distribution of taurine in dairy products.** *Food Chemistry* 46(4): 1993: 429-437

The technique developed is based on dansylation of the free amino acids and separation of the derivatives using HPLC and UV detection and is suitable for rapid data collection at sample concn. and above 100 mg/100 g and can be extended using fluorescence to assay products with lower taurine contnets. The technique was applied to investigate the temporal variation of taurine in milk from single animal and from pooled herd milk: seasonal and annual variations in whole milk and skim powders and other powdered dairy products such as casein and whey protein.. SD

Milk

1912

Gokulakrishnan (SS), Solanky (MJ) and Thakar (PN). **Reactivation of milk alkaline phosphatase in milk and milk products - a review.** *Indian Dairyman* 45(3): 1993: 109-112

In the light of 5 existing theories of reactivation the phenomena occuring in fluid milks, cream, butter and fermented milk are reviewed. Most of the dairies in India pasteurize milk at much higher temp. (about 80°C) than the prescribed temp. - Glutamyl transpeptidase (GGTP) which is inactivated at 77°C/16 s may be considered as index enzyme. The activities of this enzyme (GGTP) in heat treated samples were not affected on storage at 4°C/48 h and its destruction is similar to that of lactoperoxidase. Since the microbiological quality of raw milk in India is poor, more investigations regarding the reactivated (alkaline phosphatases), microbial enzyme and GGTP are necessary. GS

1913

Saidi (B) and Warthesen (JJ). **Heat and fermentation effects on total nonprotein nitrogen and urea in milk.** *Journal of Food Science* 58(3): 1993: 548-551

Non-protein Nitrogen (NPN) in Moroccan milk was between 189 and 273 mg/L with an av. of 215 mg/L. NPN increase during heating followed zero-order kinetics with an energy of activation of 17 kcal/mol. Urea decreased during heating and followed pseudo first-order kinetics 20 kcal/mole. NPN varied in commercial yoghurt (150 mg/kg) and leben batches (208 mg/L) but increased during fermentation. Urea did not change with these fermentation processes. SRA

1914

Renken (SA) and Warthesen (JJ). **Vitamin D stability in milk.** *Journal of Food Science* 58(3): 1993; 552-556, 566

A method was developed to determine vitamin D_3, in milk. It includes saponification, solid phase extraction and HPLC. Recovery of added vitamin D_3 was 93%. Vitamin D_3 concn. in commercial milks were variable. Stability studies showed that on exposure to light, there was a slight loss of vitamin D_3 from fortified milk. Air exposure did not affect stability in milk. Upon standing there was some stratification of the vitamin in milk containers with slightly more vitamin D_3 in the top layer of milk than at the bottom. AA

1915

Indyk (HE), Lawrence (R) and Broda (D). **The micronutrient content of bovine whole milk powder: Influence of pasture feeding and season.** *Food Chemistry* 46(4): 1993; 389-396

A combination of techniques was used to investigate the content of water-soluble vitamins (thiamin, riboflavin, niacinamide, pyridoxal, ascorbic acid, choline, inositol, biotin, pantothenate, folate and vitamin B_{12}) and fat-soluble vitamins (A, E and β-carotene) in spray-dried whole milk across an entire production season. The exclusive pasture feeding husbandry practised in the collection region, coupled with a confined calving period, has facilitated an interpretation of temporal variations in nutrient content, undistorted by the influence of variable feeding and staggered lactation regimes employed in previous surveys of this type. This information is intended to extend the current global information regarding milk and its products. AA

1916

Reddy (KK), Nguyen (MH), Kailasapathy (K) and Zadow (JC). **Evaluation of reduced-fat ultrafiltration UHT milk.** *ASEAN Food Journal* 7(3): 1992; 152-156

A reduced-fat ultrafiltered ultra-high-temp. (UF-UHT) processed milk was produced by ultrafiltration of low-fat milk to a total solid content of 13.05% followed by heat processing at 135°C for 6 sec. The product contained 5.18% protein and 1.4% fat. The control UHT milk contained 3.31% protein and 3.6% fat. The physical, chemical and organoleptic properties of the UF-UHT milk were evaluated immediately after manufacture and after storage at 37, 20-22 and 4-6°C. The UF-UHT milk had a slightly higher viscosity and higher pH values than the control UHT whole milk and age gelation occurred earlier in UF-UHT than in control UHT milk. The UF-UHT milk showed higher sedimentation and lower heat stability. The initial acceptability of UF-UHT was comparable to that of UHT whole milk stored under 4-6°C over a 10 wk period. After 10 wk of storage at 20-22°C the control milk was prefered to UF-UHT milk. After 10 wk of storage at 37°C both milks were considered not suitable for consumption. SRA

1917

Rodriguez (E), Martin (R), Garcia (T), Gonzalez (I), Morales (P), Sanz (B), Hernandez (PE). **Detection of cow's milk in ewes' milk and cheese by a sandwich enzyme-linked immunosorbent assay (ELISA).** *Journal of the Science of Food and Agriculture* 61(2): 1993; 175-180

A sandwich enzyme-linked immunosorbent assay (ELISA) has been successfully developed for the detection of defined amounts of cows' milk in ewes' milk and cheese. Polyclonal antibodies were raised in goats against bovine caseins (BC). The resultant antibodies were recovered from the crude antiserum by ammonium sulphate precipitation and further purified by immunoadsorption of the cross-reacting antibodies onto columns containing immobilised ovine, caprine and bovine caseins, followed by elution of the bovine caseins specific antibodies (anti-BC) from the column containing the bovine caseins. The anti=BC bound to the wells of a microtitre plate were used to capture the BC from milk and cheese mixtures. Further immunorecognition of the captured proteins was attained with the same specific antibodies conjugated to biotin. ExtrAvidin-peroxidase was used to detect biotinylated antibodies bound to their specific antigens. Subsequent enzymic conversion of substrate gave clear absorbance differences when assaying mixtures of ewes' milk and cheese containing variable amounts of cows' milk. AA

Milk products

1918

Imaizumi (K), Hirata (K), Zommara (M), Sugano (M) and Suzuki (Y). **Effects of cultured milk products by *Lactobacillus* and *Bifidobacterium* species on the secretion of bile acids in hepatocytes and in rats.** *Journal of Nutritional Science and Vitaminology* 38(4): 1992; 343-351

Whey preparations prepared from cultured milk by 19 *Lactobacillus* (2 sp.) and 20 *Bifidobacterium* (5 sp.) strains were examined for the effects of secretion and synthesis of bile acids in primary cultured rat hepatocytes. The stimulating effect of whey preparation on bile acid secretion depended on the sp. as well as the strains used for milk fermentation. Two strains belonging to *L. casei* SBT 2230 (LC2230) and *B. longum* SBT 2912 (BL2912) produced the

whey which stimulates both the secretion of bile acid and the activity of cholesterol 7α-hydroxylase, a great limiting enzyme for bile acid synthesis. When the cultured products by these two strains were given to rats for 14 days, the products from *L. casei* (LC2230) were found to stimulate the biliary secretion of bile acids. These results suggest that primary cultured hepatocytes were a useful experimental system as an initial screening for an active principle modulating cholesterol metabolism. AA

Ghee

1919

Al-Khalifah (A) and Al-Kahtani (H). **Composition of ghee (*Samn Barri's*) from cows' and sheeps' milk.** *Food Chemistry* 46(4): 1993: 373-375

In sheep ghee iodine number was lower, saponification number higher and 1,2-diacylglycerides absent. In both vitamin A ranged from 315-376 µm/100g, cholesterol from 252-284 mg/100g, fatty acid composition showed a relatively high degree of saturation (53.9 - 66.8%) with (16:0 (31.7 - 38.3%)) and (18:1 (21.6 - 33.7)) being the predominant saturated and unsaturated fatty acids respectively. SD

Wheys

1920

Barefoot (SF), Han (IY), Thomas (RL), Cordle (CT) and Criswell (LG). **Prefiltration using formed-in-place metallic membranes reduces microbial content of whey.** *Journal of Food Science* 58(3): 1993: 544-547

Membranes were challenged with whey containing *Lactococcus lactis* ssp. *lactis*. Logarithmic reduction values (LRV) of lactococci and rejection of immunoglobulin G (IgG) were measured. Increasing lactococci from 10^7 to 10^9 did not affect IgG rejection. Of 20 membranes formed on conventional stainless steel substrates, none achieved 5 LRV and passed > 50% IgG. Challenges of 20 DS-type altered substrates with 3mM phosphate buffer containing lactococci yielded 5.2 average LRV. DS-type substrates used to microfilter whey containing lactococci yielded 5.3 to 7.3 LRV and passed 66% to 77% of the IgG. AA

MEAT AND POULTRY

Meat

1921

Panda (PC). **Use of casings for development of meat products.** *Poultry Guide* 30(8): 1993: 53-54

Four types of casings for meat products, viz. animal, cellulose, cloth and regenerated collagen casings are described. Evaluation of casings based on their cleanliness, strength, length, diam., curing and packing factors is done. GS

1922

Lecomte (NB), Zayas (JF) and Kastner (CL). **Soya proteins functional and sensory characteristics improved in comminuted meats.** *Journal of Food Science* 58(3): 1993: 464-466, 472

This study evaluated the functional and sensory characteristics of frankfurters made with soy flour, conc., or isolate incorporated in formulations either as a powder or in a form of preemulsified fat (PEF). Analysis showed that incorporation of soya proteins as PEF resulted in a reduction of specific off-flavour (beany, and bitterness) and off-aroma. Soya proteins added as PEF increased water-holding capacity and yield, decreased cook losses, and had no detrimental effect on colour. Using soya proteins as stabilizer in PEF could improve functionality of these proteins and sensory characteristics of comminuted meats to which they are added. SRA

1923

Zorba (O), Gokalp (HY), Yetim (H) and Ockerman (HW). **Salt, phosphate and oil temperature effects on emulsion capacity of fresh or frozen meat and sheep tail fat.** *Journal of Food Science* 58(3): 1993: 492-496

The emulsion capacity (EC) and microstructural properties of fresh and frozen Turkish beef using a model system in the presence of K_2HPO_4 and NaCl, and effects of different oil temp. on the EC procedure were studied. Study showed that EC of frozen meats was higher than EC of fresh meat. The oil temp. of 11°C increased the EC when compared to 5 and 21°C oil temp. The EC was also elevated significantly with increasing K_2HPO_4 and NaCl levels, and the addition of K_2HPO_4 gave a more uniform microstructure of the emulsions. SRA

Beef

1924

Miller (MF), Andersen (MK), Ramsey (CB) and Reagan (JO). **Physical and sensory characteristics of low-fat ground beef patties.** *Journal of Food Science* 58(3): 1993: 461-463

Ground beef patties with combinations of 0 to 10% added water and 0 and 0.25% added phosphate were

compared with controls (22% fat and 0% added water and phosphate). Added water increased thaw and cooking losses but improved objective texture measurements and sensory panel ratings ($P < 0.05$). Added water and phosphate increased the % of water, decreased protein and did not affect fat. Added water and/or phosphate resulted in higher ($P < 0.05$) juiciness, tenderness and overall palatability scores. Low fat patties with added water were similar to 22% fat patties. Water and/or phosphate also improved sensory ratings for texture and flavour of 10% fat patties to equal those for 22% fat patties. AA

1925

Kim (S-H), Carpenter (JA), Lanier (TC) and Wicker (L). **Polymerization of beef actomyosin induced by transglutaminase.** *Journal of Food Science* 58(3): 1993; 473-474, 491

Polymerization of beef actomyosin was induced by addition of transglutaminase. The relative intensity analyzed by densitometry after SDS-PAGE indicated that bands containing the polymerized myosin increased from 10.1 plus or minus 2.2% to 20.7 plus or minus 3.5% while the myosin monomer band decreased from 20.9 plus or minus 3.4% to 13.0 plus or minus 2.7% as the reaction time extended from 10 to 120 min at 35°C. Polymerization of actomyosin induced by transglutaminase resulted in gelation of the actomyosin that was visualized by confocal laser scanning microscopy. AA

1926

Kim (S-H), Carpenter (JA), Lanier (TC) and Wicker (L). **Setting response of alaska poliock surimi compared with beef myofibrils.** *Journal of Food Science* 58(3): 1993; 531-534

Physicochemical properties of surimi after preincubation at 25-50°C and beef myofibrils at 25-60°C for up to 8 h prior to cooking at 80°C for 20 min were evaluated by a torsion test and SDS-PAGE. Shear stress and true shear strain of surimi were more sensitive to pH changes than beef myofibrils. Max. gel strength was found at approx. pH 7 for surimi and pH 6 for beef myofibrils. The myofibrils showed no setting effect at any preincubation temp. examined, while surimi showed an optimum setting effect at 25°C. Incorporation of beef myofibrils into surimi resulted in decrease of shear stress and true shear strain values. AA

1927

Krishnan (KR) and Sharma (N). **Studies on chilled and frozen stored ready-to-eat buffalo beef sausages prepared by incorporating skeletal and offal meats with 20% pork fat.** *Journal of Food Science and Technology (India)* 30(4): 1993; 301-302

Emulsion-type buffalo beef sausages, prepared by incorporating 70 and 30 parts of skeletal and offal meats, respectively with 20% pork fat, were stored at chilled and frozen temp. Sausages stored well at 4 - 5°C for 7 days and at -10°C for 8 wks. Sliminess did not develop, till 7 days in chilled storage. However, a significant ($P < 0.01$) increase in aerobic plate count from 3.75 to 3.89 log/g was observed. In frozen storage sausages, a significant ($P < 0.01$) reduction in aerobic plate count from 3.75 to 3.53 log/g was observed after 7 days. The changes in plate count were marginal at 8 wks of storage. The initial thiobarbituric acid value of 0.49 mg of malonaldehyde/kg showed a decreasing trend and it was 0.14 mg at 8th wk. AA

Mutton

1928

McCormick (RJ), Bugren (S), Field (RA), Rule (DC) and Busboom (JR). **Surimi-like products from mutton.** *Journal of Food Science* 58(3): 1993; 497-500

This study was conducted to characterize the proteins and lipids in surimi-like ovine products. The bind and cooked yield of restructured roasts formulated with surimi-like products were examined. Study indicated that hand bonded mutton (HBM), mechanically separated (MS) meat and MS mutton can be used commercially as a binding system in restructured roasts. HBM and MS meat added to restructured roasts at 5% as well as MS mutton added at 11% improved quality and lowered the amount of salt and phosphate needed. Production of HBM or MS meat markedly reduced the fat and bone content of MS meat when compared to MS mutton. Production of HBM and MS meat has the potential to increase the value of mutton. AA

Pork

1929

Manu-Tawiah (W), Myers (DJ), Olson (DG) and Molins (RA). **Survival and growth of *Listeria monocytogenes* and *Yersinia enterocolitica* in pork chops packaged under modified gas atmospheres.** *Journal of Food Science* 58(3): 1993; 475-479

L. monocytogenes Scott A, serotype 4b, and *Yersinia enterocolitica* from vacuum-packaged pork were inoculated onto fresh pork chops. Survival and growth were determined in different atm. at 4°C during 35-days. Atmospheres were gas mixtures [20/0/80, 40/0/60, and 40/10/50 ($CO_2/O_2/N_2$)], vacuum and air. In air *L. monocytogenes* and *Y. enterocolitica* grew slower than psychrotrophic

spoilage flora. In gas atm., *Y. enterocolitica* grew at the same rate as psychrotrophic spoilage flora and *L. monocytogenes* grew more slowly. When 10% O_2 was included in the 40% CO_2 mixture, growth was reduced. Vacuum packaging was no more effective than gas mixtures in retarding growth. Modified atmospheres provide an environment in the package that would allow growth of *Y. enterocolitica* and potentially compromise safety of meat products. AA

1930

Prusa (KJ), Fedler (CA) and Miller (LF). **National in-home consumer evaluation of pork roasts from pigs administered porcine somatotropin (pSt).** *Journal of Food Science* 58(3): 1993: 480-481, 496

Boneless pork loin (longissimus) or ham (semimembranosus) roasts from 60 control and 60 pSt-produced pigs (3 mg daily) were analyzed for composition and evaluated by 120 families in each of 3 major cities. In San Antonio and Portland each family received a loin roast from a control pig and a pSt-treated pig. In Buffalo, each family received a fresh ham roast from a control pig and a pSt-treated pig. Consumers were asked to evaluate the roasts during conventional in-home meal preparation and consumption. Overall, pSt roasts contained less intramuscular fat and no differences were noted in acceptability scores when control loin or ham roasts were compared with pSt-produced loin or ham roasts. No differences were noted in the preference scores for the loin roasts; however, consumers preferred the tenderness, juiciness and flavour of the control ham roasts. AA

1931

Bradford (DD), Huffman (DL), Egbert (WR) and Jones (WR). **Low-fat fresh pork sausage patty stability in refrigerated storage with potassium lactate.** *Journal of Food Science* 58(3): 1993: 488-491

Typical pork sausage patties (40% fat), low-fat (8%) control patties, and low-fat (8%) patties with 20% added water and 0.4% carrageenan were compared to identical treatments containing 2% potassium lactate (PL). The lactate had no effect on percent discoloration or lean colour during refrigerated aerobic storage. Sensory properties of pork sausage treatments were not affected by the lactate salt ($P < 0.05$). Bacterial populations of low-fat pork sausage patties did not differ ($P > 0.05$); however, the typical patties with 2% PL had lower ($P < 0.05$) microbial numbers during refrigerated storage than typical fresh pork sausage. TBARS, 'L', 'a' and 'b' values were unaffected by the PL ($P > 0.05$). AA

1932

Motilva (M-J) and Toldra (F). **Effect of curing agents and water activity on pork muscle and adipose subcutaneous tissue lipolytic activity.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 196(3): 1993: 228-232

Products

Bologna

1933

Bishop (DJ), Olson (DG) and Knipe (CL). **Pre-emulsified corn oil, pork fat, or added moisture affect quality of reduced fat bologna quality.** *Journal of Food Science* 58(3): 1993: 484-487

Replacing fat with additional water prevented the increase in firmness normally associated with low-fat meat products. Pre-emulsifying the fat or oil also decreased the firmness of reduced-fat bologna. The colour of reduced fat bologna was darker for all except the pre-emulsified corn oil treatments. Redness values for the intact (reduced) fat were the highest of all treatments. Pre-emulsifying fats caused a reduction in redness values for bologna. Flavour and overall acceptability scores from a consumer sensory panel did not differ among bologna samples, but juiciness scores were higher in bologna containing additional water. Accumulated purge in vacuum packages increased with water content in the products and with addition of pre-emulsified oil. AA

Ham

1934

McKeith (FK), Brewer (MS), Osadjan (PD), Matulis (RJ) and Bechtel (PJ). **Sensory and textural characteristics of restructured ham coated with emulsions of different fat levels.** *Journal of Food Science* 58(3): 1993: 482-483

Emulsion-coated, restructured hams were prepared using emulsions containing 4.2, 6.9, 17.3 and 25.4% fat. Ham chunks were emulsion coated, stuffed into 9.8 cm fibrous casings, cooked and sliced. Slices were subjected to visual and sensory evaluation and Instron binding strength evaluation. Emulsion fat content did not affect ($P < 0.05$) sensory characteristics, Instron breaking force or tensile strength. High fat level (25.4%) reduced visual bind uniformity and overall appearance but did not affect other sensory characteristics. AA

Poultry

1935

Ashok Singh. **Preservation of poultry meat.** *Poultry Guide* 39(8): 1993: 46-47

Describes the methods of poultry meat preservation (freezing, canning and smoking). Freezing methods include frozen food lockers, freezing cabinets and large refrigerators. Smoking is done in two ways. Smoked-salt is used in brine or meat is cured in sugar and salt brine and then smoked. Full chicken / half chicken or boneless chicken or cooked meat with other ingredients are canned. Use of antibiotics, fungicides, 20-25% CO_2 and β-radiation are effective in prolonging the shelf-life of poultry meat. GS

Chickens

1936

Olds (SJ), Vanderslice (JT) and Brochetti (D). **Vitamin B_6 in raw and fried chicken by HPLC.** *Journal of Food Science* 58(3): 1993: 505-507, 561

A method was developed using HPLC ion exchange, to analyse 5 of the 6 vitamers of B_6 in a complex food system choosing fast food fried chicken. Recoveries of the B_6 vitamers in a standard were 100% to 97%. Recoveries in fried chicken breast ranged from 96% for pyridoxal phosphate to 102% for pyridoxine (PN). Recoveries in raw chicken breast ranged from 86% for pyridoxamine to 102% for PN. The loss of total B_6 during processing was 6.5%, with overall retention of 93.5%. Vitamers appeared to be stable to deep fat frying. SRA

1937

Chi (SP) and Chen (TC). **Predicting optimum monosodium glutamate and sodium chloride concentrations in chicken broth as affected by spice addition.** *Journal of Food Processing Preservation* 16(5): 1992: 313-326

Chicken broth, spiced and non spiced, were prepared with 9 varying levels of monosodium glutamate (MSG) and NaCl and evaluated by 12 trained accessors in 2 replicate sessions on a 9-point hedonic scale. Response surface method applied to data yielded 0.33% MSG and 0.83% NaCl for nonspiced broth and 0.38% MSG and 0.57% NaCl for spiced broth as optimum levles. SD

Broilers

1938

Jubarah (SK) and Elzubeir (EA). **Effect of dietary sorghum germ meal on performance and meat quality of broiler chicks.** *Journal of the Science of Food and Agriculture* 58(3): 1992: 301-305

Lohmann broiler chicks fed with sorghum germ meal (SGM) at different levels (0, 75, 150, 225g Kg^{-1}) showed no detectably different effect on the colour, juiciness, tenderness and flavour of the meat. GS

1939

Sachdev (AK) and Verma (SS). **Effect of processing on microstructure of broiler meat.** *Beverage and Food World* 20(3): 1993: 23-24

A review regarding effect of various types of processing including physical, chemical treatments and thermal processing on microstructure and some of the acceptability traits of broiler meat. References has also been made of similar kinds of studies in other species. 18 references. BV

Turkeys

1940

Li (W), Bowers (JA), Craig (JA) and Perng (SK). **Sodium tripolyphosphate stability and effect in ground turkey meat.** *Journal of Food Science* 58(3): 1993: 501-504, 521

The effects of internal cooking temp. and storage time on the stability of sodium tripolyphosphate (STP) and the relationship of STP hydrolysis to water holding capacity (WHC), pH and microbial growth were studied. Ground turkey meat, cooked and uncooked was prepared with and without 0.5% STP and stored at 5°C for different periods of time. STP hydrolysed rapidly in uncooked samples. Refrigerated storage time (upto 6 days) did not affect STP hydrolysis in cooked turkey meat. STP hydrolysis was accelerated by heating. End point temp. (65, 75 and 85°C) did not affect the extent of STP hydrolysis. STP increased WHC in both cooked and uncooked samples. STP did not inhibit mesophilic microbial growth in cooked and uncooked ground turkey meat. SRA

Products

Eggs

1941

Frampton (A). **Egg as a food ingredient in processed food.** *Food Science and Technology Today* 7(1): 1993: 36-41

The application of egg and egg derivatives (the functionality, colour, flavour), structure/texture (emulsification, coagulation and foaming), disadvantages of using egg and egg derivatives, their microbiological safety and the user requirements for egg and egg derivatives are discussed. GS

1942

Satyanarayana Rao (TS). **Palatability of spray-dried, foam-mat-dried and freeze-dried whole egg powders packed in different packaging materials.** *Journal of Food Science and Technology (India)* 30(4): 1993: 298-300

Freeze-dried and foam-mat-dried whole hen's egg powders, prepared from egg melange of uniform composition, and commercial spray-dried egg powders were packed in cans and in flexible pouches with and without air. Drying conditions and packaging materials did not significantly influence the acceptability of egg powders during storage at 4, 19-27, 37 and 42°C in all 3 types of egg powders upto a period of 1 yr. AA

1943

Jacobs (K), Shen (L), Benemariya (H) and Deelstra (H). **Selenium distribution in egg white proteins.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 196(3): 1993: 236-238

The present studies were undertaken to characterize selenium distribution in egg white. Ion-exchange chromatography fast protein liquid chromatography (FPLC) and flow injection atomic (absorption) spectrometry (FIAS) were used to separate egg white proteins and to determine the selenium content of different fractions. After purification, nine different proteins were identified with sodium dodecyl sulphate-polyacrylamide gel electrophoresis and 56% of the total selenium content was found to be associated with ovalbumin-1, and -2 (plus or minus 500 ng/g), which is the main protein in egg white. Flavoprotein was determined to be the richest selenium-containing protein (1800 ng/g). The selenium content of the other proteins (lysozyme, canalbumin, globumin, globulins and ovomucoid) ranged from 359 to 1094 ng/g. AA

SEAFOODS

1944

Gautam (OS). **Eating through the eyes and brains.** *Seafood Export Journal* 25(6): 1993: 5-7

Outlines the recent technological achievements of Indian seafood industry, the quality control measures and the steps to achieve consumer acceptance of seafood products. Improtance of attractive, appealing, eye pleasing packing of Indian seafood products for export market is stressed. GS

1945

Md Shafiur Rahman. **Specific heat of selected fresh seafood.** *Journal of Food Science* 58(3): 1993: 522-524, 566

The specific heat of selected fresh seafood (calamari, cuttle fish, prawn, octopus and squid) measured by method of mixture varied from 3.29 to 3.79 kJ/kg K. A semi-empirical model based on the additive model, which included an extra term for the fraction of bound water and interaction between the phases, improved specific heat predictions based on composition. AA

Crabs

1946

Cha (YJ), Cadwallander (KR) and Baek (HH). **Volatile flavour components in snow crab cooker effluent and effluent concentrate.** *Journal of Food Science* 58(3): 1993: 525-530

Snow crab (*Chionoecetes japonicus*) cooker effluent (SCCE) and effluent concentrate (EC) were examined for volatile flavour components to assess the commercial feasibility of using EC as a flavouring agent. Total ion chromatograms of volatile components in SCCE and EC showed a total of 122 volatile compounds. These included 11 aldehydes, 14 ketones, 13 alcohols, 21 aromatic hydrocarbons, 24 nitrogen-containing compounds, 10 sulphur-containing compounds. Among these, 97 were positively identified. 110 compounds were detected in SCCE and 90 were found in EC, indicating some loss of volatile compounds during concn. SRA

Lobster

1947

Chen (JS), Balaban (MO), Wei (CI), Gleeson (RA) and Marshall (MR). **Effect of carbon dioxide on teh inactivation of florida spiny lobster polyphenol oxidase.** *Journal of the Science of Food and Agriculture* 61(2): 1993: 253-259

Florida spiny lobster (*Panulirus argus*) polyphenol oxidase (PPO) exposed to CO_2 (1 atm) at 33, 38 and 43°C showed a decrease in enzyme activity with increased heating time. Enzyme inactivation by CO_2 was faster for PPO heated at 43 than at 33 or 38°C. Inactivation kinetics revealed PPO was more labile to CO_2 and heat in the range 33-43°C than to heat alone. Kinetic data also revealed that CO_2, in addition to pH changes, was involved in the loss of PPO activity. Studies using gel electrophoresis showed no differences in protein patterns and isoelectric point between CO_2-treted and non-treated control. The pH of CO_2-treated PPO

stock solution was brought back from 5.4 to 8.0 after 6 wks of frozen-storage and no enzyme reactivation was observed. AA

Prawns

1948

Kannan (N) and Bandyopadhyay (S). **System analysis of a prawn freezing plant - I. Analysis of raw prawn preparation and freezing operations.** *Fishery Technology* 30(2): 1993: 122-126

A system analysis approach was taken to study and analyse various operations of a hypotetical prawn freezing plant. Results of analysis for processing three different products showed that the data on rate of prawn handling by a number of workers can be fitted to linear relations and optimum operating conditions can be arrived at with min. freezer idle time and max. number of loads per freezer. Also scheduling of prawn preparation time was found very crucial during the early stage of processing. AA

Shrimps

1949

Dordi (MC). **Assessment and analysis of present system of packaging of IQF shrimp - improvements needed.** *Packaging India* 25(3): 1992: 17, 19, 21, 23, 25, 26

Salient features of the different forms of individually quick frozen (IQF) shrimps exported, the system involved in the packaging of IQF products such as unit pouch/wrapper, unit carton, master carton, closure, storage and warehousing, transportation of shrimp packages, problems faced and suggested improvements in the packaging system, cost effective measures in present packaging system and packaging requirements of IQF shrimps for export to EEC countries are summarised in this article. CSA

1950

Venugoapal (TN). **Influence of species and size on weight loss during thawing of frozen shrimps.** *Fishery Technology* 30(2): 1993: 119-121

Extent of wt. loss in different size grades of two types of products prepared from 2 shrimp sp. (*P. stylifera* and *M. dobsoni*) viz. peeled and undevecined (PUD) and peeled and deviened (PU) were studied. No significant difference was noticed between the wt. loss of PD and PUD meat of *P. stylifera*, but in *M. dobsoni* significant difference was noticed between PD and PUD meat of the size grade 200/300. In general the wt. loss increased significantly as the size of shrimps decreased. Difference in wt. loss between the same grade of the two sp. and two packing styles was rarely observed. SRA

1951

Kandoran (MK), Balasubramaniam (S), Thomas (M), Thiagarajan (R) and Nair (AKK). **Predictive analysis of variables related with the adoption of quality control practices by the shrimp freezing plants.** *Fishery Technology* 30(2): 1993: 147-153

Mean adoption quotient scores calculated among the shrimp freezing plants in India, 79.20% from quality control and inspection in approved units; 83.99% from in-process quality control and 80.92% from combined samples were quite high. Regression analysis of the combined sample showed that the 4 variables - number of yr of functioning as shrimp freezing plant, ice production capacity number of technical personnel and number of yr of experience of the senior technologist significnatly influenced the extent of adoption of quality control practices. SD

Fish

1952

Vinh (PQ), Alur (MD) and Nair (PM). **Storage properties of gamma-irradiated semi-dried fish varieties.** *Fishery Technology* 30(2): 1993: 127-129

Semi-dried, unirradiated and irradiated (1 and 3 kGy) fish var. anchovies (*Stolephorus commerxonii*), Bombay duck (*Harooddnnephereus*), shrimp (*Penaeus indicus*), and Vietnam scad (*Alepes mate*) stored at ambient temp. (26°C) were studied for total bacterial cout (TBC), mould count and biochemical indices of freshness. Initial TBC of semi-dried fish varied from 700-5400 cfu/g, and mould count from 27-1500 cfu/g. Radiation reduced the initial bacterial load considerably and completely eliminated moulds except in semi-dried Bombay duck. Vietnam scad was not contaminated with mould after 3-5 months storage at room temp. TVA and TVBN in both irradiated and non-irradiated samples increased during ambient temp. storage. Gamma radiation could effectively reduce initial bacterial contamination and mould count facilitating extension in storage stability of these products. SRA

1953

Chakrabarti (R). **Processing of *Psenes indicus*, *Decapterus* sp. and *Stolephorus* sp. to dried product with low histamine and their storage characteristics.** *Fishery Technology* 30(2): 1993: 130-133

To reduce histamine levels in *P. indicus*, *Decapterus* sp. and *Stolephorus* sp. fish during storage at ambient temp. 30 plus or minus 10°C, suitable techniques were adopted - (1) whole fish were washed in clear water, ungutted and sundried (DF_1): (2) whole fish were washed, gutted, beheaded, washed in clean water and sun dried (DF_2): (3) whole fish were washed, dry salted and kept over night, thick surface layer of salt removed by rinsing and sundried (DF_3): (4) whole fish were washed, gutted, beheaded and dry salted and sundried (DF_4). It was found that histamine in $DF_1 > DF_2 > DF_3 > DF_4$. Histamine levels showed decreasing trends in *P. indicus* and *Stolephorus* sp. but was irregular in *Decapterus* sp. TVBN showed increasing trend in unsalted dried fish than salted dried fish. SRA

1954

Vinh (PQ), Alur (MD) and Nair (PM). **Sensory attributes of non-irradiated and irradiated semi-dried fish during ambient temperature storage.** *Fishery Technology* 30(2): 1993: 161-163

Irradiated, semi-dried Bombay duck (*Harpodon nehereus*) and shrimps (*Penacus indicus*) stored at ambient temp. (26°C) were evaluated for sensory quality. Non-irradiated, semi-dried Bombay duck showed heavy mould growth and were unacceptable after 6 wk while under identical conditions irradiated (3 kGy) samples scored high and mould growth was not visible. Irradiated and non-irradiated shrimps stored at ambient temp. showed similar result. SRA

1955

Chambers (EIV) and Robel (A). **Sensory characteristics of selected species of freshwater fish in retail distribution.** *Journal of Food Science* 58(3): 1993: 508-512, 561

Flavour and texture profiles of the cooked flesh of selected fresh water fish (walleye (pond-raised Kansas), crappie (Kansas), catfish, large mouth bass, hybrid striped white bass, raceway-raised rainbow trout, coho salmon, white amur, tank-raised tilapia) in retail distribution were developed by trained sensory panel. Flavour, aftertaste, texture and appearance were characterized. A variety of sp. including tilapia and hybrid bass, had overall fish like flavour and texture, and some properties similar to white meats (chicken). Catfish was earthier, softer and more gelatinous than most other fresh water fish studied. SRA

1956

Agren (JJ) and Hanninen (O). **Effects of cooking on the fatty acids of three fresh water fish species.** *Food Chemistry* 46(4): 1993: 377-382

Freshwater fishes with different sizes and lipid contents from species rainbow trout, vendace and pike were boiled, baked in normal and microwave oven and fried with sunflower and rapeseed oils were studied. The concn. of long chain n-3 fatty acids in fish flesh increased in most cases due to cooking and moisture loss. In baked and microwave-cooked vendace their concn. increased to about 40% even on dry wt. basis. The absorption of n-6 fatty acids from cooking oils may interfere with the biological effects of n-3 fatty acids. In general all usual cooking methods can be adopted without significant loss of n-3 fatty acids. However cooking methods without additional oil especially without oils rich in n-6 fatty acids are preferable. SD

Anchovies

1957

Kwon (JH), Byun (MW), Warrier (SB), Kamat (AS), Alur (MD), Nair (PM). **Quality changes in irradiated and non-irradiated boiled-dried anchovies after inter-country transporation and storage at 25°C.** *Journal of Food Science and Technology (India)* 30(4): 1993: 256-260

Samples of nonirradiated and irradiated (5 kGy) dried anchovies (*Engraulis encrasicholus*) were transported from Korea to India for evaluation of microbiological, physico-chemical and organoleptic parameters during storage. The nonirradiated anchovies showed mould growth and an increase in total bacterial count in the three log cycles over the initial load, after 4 months of storage at 25°C. However, 5 kGy irradiated samples packed with a laminated nylon/polyethylene (NY/PE) film exhibited 10^2 bacterial cell per g even after 6 months storage. Hunter's colour value, total volatile basic nitrogen, browning and lipid oxidation showed a good correlation with the organoleptic quality of stored anchovies. Partial changes in irradiated anchovies did not influence organoleptic acceptability. Differences in the levels of total volatile basic nitrogen and total volatile acid values in irradiated and nonirradiated samples may prove useful in distinguishing irradiated Korean anchovies from nonirradiated samples. AA

Capelin

1958

Raksakulthai (N) and Haard (NF). **Fish sauce from capelin (*Mallotus villosus*): Contribution of cathepsin C to the fermentation.** *ASEAN Food Journal* 7(3): 1992: 147-151

Addition of squid hepato pancreas tissue (SHT) during fermentation provided an excellent quality

fish sauce from male inshore capelin. The best conditions for fermentation were 2.5% SHT, 25% NaCl, pH 6, at 20 - 25°C for about 6 months. Additional aging of the product from 6 months to 1 yr did not show any significant effect on the sensory properties nor on the chemical composition of the product. SRA

Carp

1959

Brillantes (S). **Fish noodles using Indian carp.** *ASEAN Food Journal* 7(3): 1992: 137-140

Yield, cost, proximate composition and the effect of storage on quality of fish noodles produced from Indian carp (*Labeo rohita*) were studied. Whole fish fillets were treated in three ways (a) minced by a mechanincal mincer, (b) minced manually, washed twice with iced water then drained and (c) minced manually with dark meat removed. Fish noodles obtained were steam cooked, dried under the sun and packed in polyethylene bags. Analysis of these samples showed that, in terms of yield and cost, sample A was the best, followed by sample C. All samples were acceptable to the panelists but sample C was unanimously favoured in terms of colour, flavour and texture. All samples were stable after 4 months of storage at ambient conditions using simple packaging. SRA

Catfish

1960

Huang (Y-W), Leung (C-K), Harrison (MA) and Gates (KW). **Fate of *Listeria monocytogenes* and *Aeromonas hydrophila* on catfish fillets cooked in a microwave oven.** *Journal of Food Science* 58(3): 1993: 519-521

Channel catfish fillets were inoculated with approx. 10^6 cell/cm^2 each of *L. monocytogenes* and *Aer. hydrophila* and cooked in a microwave oven to internal temp. of 55, 60 and 70°C. Fillets were either left uncovered or covered with PVC films during cooking. Covered catfish fillets cooked at 70°C internal temp. destroyed *L. monocytogenes* and *Aer. hydrophila* cells by a factor of 6 log cycles. *L. monocytogenes* was more heat resistant than *Aer. hydrophila* and a population of 10^2 - 10^4 cells/cm^2 was detected after cooking at 55 or 60°C. SRA

Cod

1961

Chalmers (M), Careche (M) and Mackie (IM). **Properties of actomyosin isolated from cod (*Gadus morhua*) after various periods of storage in ice.** *Journal of the Science of Food and Agriculture* 58(3): 1992: 375-383

Natural actomyosin was isolated from cod (*G. marhua* L.) stored in ice for upto 28 days. The gelling properties, apparent viscosity, Ca^{2+}-ATPase activity and component protein composition by sodium dodecyl sulphate (SDS) electrophoresis were determined for each preparation of natural actomyosin. The apparent viscosity, protease activity, trimethylamine (TMA) content and pH of the fish muscle were also determined. The results showed that the apparent viscosity and Ca^{2+}-ATPase activity tended to decrease slightly during ageing of the fish in ice, whereas some of the gelling properties showed a max. between 3 and 6 days of storage. However, there was no change in the apparent viscosity of the muscle as a whole even after the fish were considered to be stale according to the TMA values. The ratio of myosin heavy chain to actin in the actomyosin changed with the time of storage of the fish, being highest at 3 days when gelling properties were maximal and decreasing progressively thereafter. AA

Mackerels

1962

Poernomo (A), Giyatmi, Fawzya (YN) and Ariyani (F). **Salting and drying of mackerel (*Rastrelliger kanagurta*).** *ASEAN Food Journal* 7(3): 1992: 141-146

Reports the study conducted on the salting (in 15, 21 and 27% saturated brine) and drying requirements for mackerel (*Rastrelliger kanagurta*) as well as the deterioration of the salted dried products at ambient temp. The study showed that brine concn. affected the rate of salt uptake and moisture loss; the lower the brine concn. the lower the rate. Salted fish did not show any constnt rate drying period. During first hours of drying, fish salted in lower brine concn. dried at higher rate than those salted in higher brine concn. Changes in quality were noticed in dried salted fish during storage at ambient temp. Dried fish salted in 15% brine was found unacceptable after 6 wks storage. From the economic point salting 21% brine concn. for 16 h is recommended to produce dried salted fish with reasonable shelf-life. SRA

Perch

1963

Khuntia (BK), Srikar (LN), Reddy (GVS) and Srinivasa (BR). **Effect of food additives on quality of salted pink perch (*Nemipterus japonicus*).** *Journal of Food Science and Technology (India)* 30(4): 1993: 261-264

Wet salted pink perch, *Nemipterus japonicus* (Bloch), prepared using a curing mixture containing common salt, three preservatives (sodium benzoate, potassium sorbate and sodium dihydrogen phosphate), and an antioxidant (butylated hydroxy anisole), was found to have better keeping quality and longer shelf-life over those prepared using common salt alone. Thiobarbituric acid number (TBA number), free fatty acids (FFA), total volatile base nitrogen (TVBN), alpha-amino nitrogen (AAN) and total plate count (TPC) increased during storage, thereby resulting in decreased sensory scores for overall acceptability. Food additives were found to effectively enhance the quality, and extend the shelf-life of salted fish considerably. Further, the effect of the additives was observed to be slightly more pronounced at ambient temp. (26.8 plus or minus 3.3°C) than at cooler storage temp. (2.5 plus or minum 1°C). AA

Rainbow trout

1964

Ingemansson (T), Pettersson (A) and Kaufmann (P). **Lipid hydrolysis and oxidation related to astaxanthin content in light and dark muscle of frozen stored rainbow trout (*Oncorhynchus mykiss*).** *Journal of Food Science* 58(3): 1993: 513-518

This study indicated that astaxanthin significantly decreased during frozen storage of light and dark muscle of farmed rainbow trout. Astaxanthin supplementation of farmed fish, did not affect lipid stability to hydrolysis and oxidation during frozen storage. SRA

Salmon

1965

Waagbo (R), Sandnes (K), Torrissen (OJ), Sandvin (A) and Lie (O). **Chemical and sensory evaluation of fillets from Atlantic salmon (*Salmo salar*) fed three levels of N-3 polyunsaturated fatty acids at two levels of vitamin E.** *Food Chemistry* 46(4): 1993: 361-366

Atlantic salmon were fed 3 dietary levels (1.0, 2.5 and 5.0% of the diets at 17% feed lipid level) of n-3 polyunsaturated fatty acids (PUFA, obtained with the use of soybean oil, capelin oil and sardine oil respectively), each with 2 levels of vitamin E supplementation (0 and 300 mg α-tocopherol acetate/kg diet). Cooked fillet from fresh, 4 days frozen, 5 wk frozen (-18°C) and traditionally smoked fresh fish were evaluated. Fillet fatty acid composition affected taste and texture and a high vitamin E improved rancid flavour scores in fillets with increasing contents of n-3 PUFA. The results indicate that feed formulations which take into account preferences of the consumer with respect to acceptability, quality and quantity of nutrients are possible. SD

1966

Hammad (AAI) and El-Mongy (TM). **Shelf-life extension and improvement of the microbiological quality of smoked salmon by irradiation.** *Journal of Food Processing Preservation* 16(5): 1992: 361-370

Microbiological and sensory qualities were studied on cold-smoked salmon irradiated at 2, 4 kGy, and unirradiated during storage at 2-3°C. 2 kGy irradiation improved the hygienic quality of smoked salmon to meet the microbiological limits for the top grade quality. Irradiated samples at 4 kGy were free from coliform, fecal streptococci and *Staph. aureus* over the entire 4 months storage. Unirradiated samples reached the max. accepted mesophilic plate count after 1 month, 2 kGy irradiated after 3 months and 4 kGy irradiated after 4 months. 4 kGy irradiated sample showed district loss in cherry red colour. 2 kGy irradiated and irradiated samples showed no difference in sensory qualities. SD

Products

Fish

1967

Yi (O-S), Han (D) and Shin (H-K). **Synergistic antioxidative effects of tocopherol and ascorbic acid in fish oil/lecithin/water system.** *Journal of the American Oil Chemist's Society* 68(11): 1991: 881-883

Individual and combined effects of ascorbic acid and δ-tocopherol on the autoxidation of fish oil have been evaluated with the induction period monitored by Rancimat. The antioxidative efficiency of them was found to increase with increasing concn. δ-Tocopherol and ascorbic acid acted highly synergistic with each other. When δ-tocopherol content was varied at a fixed content of ascorbic acid, the synergistic efficiency was generally 100% or more. On the other hand, when ascorbic acid content was varied at a fixed content of δ-tocopherol, the synergistic efficiency rose sigmoidally with increasing concn. It was concluded that at least 0.01 - 0.02% ascorbic acid is required to obtain a considerable synergistic effect with δ-tocopherol in stabilizing fish oil. AA

1968

Abraham (TJ), Sukumar (D), Shanmugam (SA) and Jeyachandran (P). **Microbial stability of certain cured fishery products.** *Fishery Technology* 30(2): 1993: 134-138

The microbial stability of cured fishery products processed by improved curing and packaging methods was studied. Improved drying methods resulted in lower microbial counts than trade samples. Slight to strong brown discolouration was noticed during storage in dried anchovy, *Stolephorus indicus*. The yellow discolouration of dried salted seer appeared to be checked by BHA treatment. BHA treatment in combination with a dip in 3% calcium propionate sol. was effective in controlling fungal growth and yellow discolouration. Cooking and hot smoking of tuna, *Euthynnus affinis*, yielded a stable product with low moisture content, while the cold blanched, hot smoked fish spoiled rapidly. In pickled prawn, *Parapenaeopsis stylifera*, with condiments and pH level around 4.75, the microbial count was greatly reduced. In lactic fermented prawn pickle, there was a steep rise in staphylococci count initially which then decreased with the reduction in pH level. AA

Surimi

1969

Chen (JS), Lee (CM) and Crapo (C). **Linear programming and response surface methodology to optimize surimi gel texture.** *Journal of Food Science* 58(3): 1993: 535-538

A formulation optimization study was conducted on surimi gels prepared with starch, and/or raw egg white employing the stepwise method (SM), linear programming (LP) and response surface methodology (RSM). At 78% moisture, the greatest gel strengthening and reduction of expressible moisture occurred at 8% starch, 6% egg white, or a combination of 5% starch and 5% egg white for SM, 5.33% starch and 4.33% egg white for LP, and 3.5% starch and 5% egg white for RSM. RSM resulted in gels with the greatest strength (compressive and penetration forces), followed by LP and SM. The RSM enabled more accurate prediction of textural behaviour of final product at various ingredient combinations than the SM or LP. AA

PROTEIN FOODS

1970

Kotwaliwale (N), Sharma (GP) and Sanjay Jain. **Moisture sorption behaviour of weaning foods.** *Journal of Food Science and Technology (India)* 30(4): 1993: 289-292

Water activity (equilibrium moisture content) data on two commercial weaning foods obtained at 20, 30, 40 and 50 plus or minus 1°C were fitted to commonly used models to study the moisture sorption behaviour. Guggenheim Anderson deBoer model described the moisture sorption better than other equations. Henderson's; Chung and Pfost and Caurie's equations predicted equilibrium moisture content more correctly with two pairs of their constants. SD

1971

Paul (SC) and Mathur (BN). **Improvement of reconstitution properties of spray dried infant formula.** *Beverage and Food World* 20(3): 1993: 22

Attempts made towards the improvement of the reconstitution properties of spray dried infant formula are discussed. BV

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

1972

Miura (T). **Beverages packaged in steel cans.** *Packaging Japan* 13(71): 1992: 46-54

Trends in the production of canned beverages, canned carbonated drinks, canned fruit drinks, canned vegetable drinks, canned favorite drinks, sale of new canned drinks, export and import of drinks is discussed in this article. CSA

1973

Busch-Stockfisch (M) and Domke (A). **Sensory evaluation of the bitter taste of amarogentin and its possible exchange for quinine in soft drinks. 2. Influence of saccharin Na/fructose mixture and anahydrous citric acid.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 196(3): 1993: 255-258 (De)

The influence of a saccharin Na/fructose mixture, anhydrous citric acid and citric flavour on the bitter taste of amarogentin, a natural bitter-tasting component of gentian root had been investigated. Sensory evaluations were aimed at establishing the possibility of exchanging amarogentin for quinine in soft drinks, sweetened by saccharin Na and fructose. The investigation was based upon the compostiion of Bitter Lemon light. Identical bitter tasts for both quinine and amarogentin could not be obtained. Quinine showed only a change in intensity of its bitter taste with concn. In contrast, amarogentin changed the bitter note. The bitter taste of

amarogentin proved to be much more sensitive to changes in concn. of anhydrous citric acid, saccharin Na and fructose than quinine. Different amarogentin concn. did not have a marked effect on the bitter note. The well-rounded and pure bitter taste of amarogentin without any aftertaste that could impair the quality showed amarogentin to be an interesting alternative bitter component in soft drinks. AA

Alcoholic beverages

Beer

1974

Fernandez (SS), Gonzalez (MG) and Sierra (JA). **Evaluation of the effect of acid washing on the fermentative and respiratory behaviour of yeasts by the acidification power test.** *Technical Quarterly, Master Brewers Association of America* 30(1): 1993: 1-8

pH used during yeast acid washings, under 2.0 and with long contact time, affected significantly the anaerobic metabolism, consequently its fermentation rate in brewery fermentation with limited inoculum rates. Acidification power test can be used as control procedure to evaluate the vitality of yeasts after acid washing procedure provided the yeast of a particular brewery should be previously examined on its tolerance to the acid treatment. SD

1975

Scheer (FM). **The influence of selected yeast strains by the production of a low calorie beer.** *Technical Quarterly, Master Brewers Association of America* 30(1): 1993: 9-13

Low carbohydrate/low calorie beer, which is produced in large vol. depends on the biochemical properties of the brewing yeast for quality and its maintenance. Two of four commercial yeast cultures studied, performed best in the required fermentation pattern. The uptake rates of carbohydrates by the four yeast strains and their impact on all malt and adjunct wort fermentation are presented. SD

1976

Kamiya (T), Kajino (K), Hiratsu (H), Mawatari (M) and Inoue (T). **A new schema for the conversion of acetolactate in young beer.** *Technical Quarterly, Master Brewers Association of America* 30(1): 1993: 14-15

Major portion of acetolactate added to beer was converted into acetoin, not into diacetyl, under anaerobic condition without any yeast activity. The reaction rate constant of the conversion of acetolactate to acetoin well agreed with that of oxidative conversion of acetolactate to diacetyl. This agreement in reaction rate constants lead us to a new schema for conversion of acetolactate in young beer. AA

1977

Langstaff (SA) and Lewis (MJ). **Foam and the perception of beer flavour and mouthfeel.** *Technical Quarterly, Master Brewers Association of America* 30(1): 1993: 16-17

Four commercial bottled beers were dispenrsed with or without foam heads and glasses were served half-full or full. Panelists evaluated the samples blindfolded first and again without blindfold to measure visual bias. Visual impact of foam head on a glass of beer is found more important than its perceived impact on beer flavour and mouthfeel. SD

Wines

1978

de Revel (G) and Bertrand (A). **A method for the detection of carbonyl compounds in wine: Glyoxal and methylglyoxal.** *Journal of the Science of Food and Agriculture* 61(2): 1993: 267-272

Wine aldehydes were identified as O-(2,3,4,5,6-pentafluorobenzyl)-hydroxylamine derivatives by GC-MS or with a GC-electron-capture detector. This method has been used to evaluate levels of glyoxal and methylglyoxal in wine. Reproducibility and linearity studies gave satisfying results. Glyoxal and methylglyoxal are formed during fermentation. Among the factors affecting their production, high musts pH increased the levels found in the corresponding wines. Various microorganisms of the wine such as *Saccharomyces cerevisiae* and *Leuconostoc anos* can produce glyoxal and methylglyoxal. The concn. in Sherry wines were particularly high. Because of the toxicological properties of these substances, their detn. and the knowledge of their metabolism by wine microorganisms are very important. AA

Non-alcoholic beverages

Fruit juices

Apple juices

1979

Su (SK), Liu (JC) and Wiley (RC). **Cross-flow microfiltration with gas backwash of apple juice.** *Journal of Food Science* 58(3): 1993: 638-641

The effects of 2 types of pressed depectinized commercially produced apple juices and several operational parameters of a pilot scale (4 m^2) microfiltration (MF) system on permeate flux, turbidity and microbiological quality of MF apple juices were studied. Periodic gas backwash (air or N_2) removed solids from exteriors of 0.2 µm cut-off hollow fiber polypropylene membranes. Commercial juices after vacuum filteration and MF had 100-110 L/m^2h flux during 2 h operation. Low pectin (1%) artificial juices had approx. 70 $L/m^2/h$ flux during 1.5 h. Nephelos turbidity units of filtrates from all treatments were < 0.69. All filtrates were commercially sterile. SRA

Raspberry juices

1980

Wrolstad (RE), McDaniel (MR), Durst (RW), Micheals (N), Lampi (KA), Beaudry (EG). **Composition and sensory characterization of red raspberry juice concentrated by direct-osmosis or evaporation.** *Journal of Food Science* 58(3); 1993; 633-637

Concn. of red raspberry juice using either osmotic or evaporative processes gave juice conc. of good quality comparable to commercial samples. Sensory analysis combined with principal component statistical techniques revealed no significant differences between the single-strength juice, the osmotic conc., the evaporation conc. and 3 of commercial samples. The osmotic conc. were clustered close to single-strength juice in red raspberry flavour aroma than the evaporation conc. sample. Compositional differences between the two types of processed juice conc. were minor. SRA

Tea

1981

Drewitt (PN), Butterworth (KR), Springall (CD) and Moorhouse (SR). **Plasma levels of aluminium after tea ingestion in healthy volunteers.** *Food and Chemical Toxicology* 31(1); 1993; 19-23

Twelve healthy volunteers on a controlled Al diet each consumed a tea infusion (500 ml/70 kg body wt.), with either milk or lemon juice as additives, or mineral water, following a three-way crossover design. The concn. of Al were determined in the diet, mineral water and tea infusions, and in plasma samples collected before and up to 24 h after consumption of tea or water, using graphite-furnace atomic absorption spectrophotometry or inductively coupled plasma emission spectrometry. Consumption of up to 1.60 mg Al from tea with milk or lemon juice did not increase plasma Al levels compared with consumption of approx. 0.001 mg Al from mineral water. The results suggest that, in the short-term, drinking tea does not contribute significantly to the total body burden of Al. AA

FATS AND OILS

1982

Achaya (KT). **Ghani, the Indian oilpress: An ancient technology.** *Current Science* 64(9); 1993; 693-698

Mention of oil in ancient Indian scriptures, the evidences available for the methods of crushing oil seeds, terminologies used for oil in the ancient Indian literature and also in other regional languages; the origin of the name ghani, its design variations, method of crushing and quantum and time of addition of water to the crusher, the professional oilseed crushers in different parts of India and the later developments especially the role played by Khadi and Village Industries Commission in India in improving the oil crushing industry are reviewed. KAR

1983

Krishnamurthy (MN). **Updated methods for detection of adulterants and contaminants in edible oils and fats. A critical evaluation.** *Journal of Food Science and Technology (India)* 30(4); 1993; 231-238

Methods to detect adulterants and contaminants in EO and fats are reviewed with their principles, sensitivities and limitations to enable quick selection of reliable ones as deliberate or accidental adulteration is increasing. Aspects reviewed include: sampling, moisutre and impurity, detection of groundnut oils (GO), sesame oil, cottonseed oil, palmolein in GO, rice bran oil in other edible vegetable oils, linseed oil, animal fat in vegetable fat, mineral oil in EO, castor oil in EO, argemone oil in EO, Karanja (*Pongamia glabra*) oil in EO, hydrocyanic acid in EO, Kusum seed (*Schleichera trijuga*) oil, tea seed (*Cammelia sininsis*) oil, tricresyl phosphates and tri-o-cresyl phosphate in EO and coal tar soluble colours in EO. 29 references. SD

Fats

1984

Toschi (TG), Capella (P), Holt (C) and Christie (WW). **A comparison of silver ion HPLC plus GC with Fourier-transform IR spectroscopy for the determination of *trans* double bonds in unsaturated fatty acids.** *Journal of the Science of Food and Agriculture* 61(2); 1993; 261-266

1985

Minguez-Mosquera (MI), Jaren-Galan (M), Hornero-Mendez (D), Garrido-Fernandez (J), Gallardo-Guerrero (ML), Gandul-Rojas (B). **Decoloration of vegetable oils and oleoresins with recovery of unaltered pigments.** *Journal of the American Oil Chemist's Society* 68(11): 1991: 809-813

The present study confirms that N,N-dimethylformamide for the extraction of chloroplast pigments from vegetable tissues shows no differences from the usual acetone or methanol. Therefore, it can be applied to fats, as it allows separation of lipids and pigments by means of phase distribution between light petroleum ether and N,N-dimethylformamide. The ether phase retains the decolored fatty matter, and the pigments dissolved in N,N-dimethylformamide can be recovered totally unaltered. This method has been applied to oleoresins and oils from different products and origins. Satisfactory results have been obtained in terms of the degree of decoloration and the percentage of oil recovered. At the same time, the unaltered pigment concentrate obtained from the hypophase could be used as a colour enhancer in the chemico-pharmaceutical industry. AA

1986

Sato (T), Kawano (S) and Iwamoto (M). **Near infrared spectral patterns of fatty acid analysis from fats and oils.** *Journal of the American Oil Chemist's Society* 68(11): 1991: 827-833

A near infrared (NIR) spectral pattern of oil contians information about fatty acid composition, becáuse NIR absorption bands around 1600-1800 nm and 2100-2200 nm are due to the straight carbon chain and *cis* double bonds, respectively. This study was undertaken to build a foundation for the rapid detn. of the fatty acid composition in oil by an NIR method. First, NIR spectra of pure triglycerides were measured and characterized. Fatty acid compositions could be estimated roughly by comparing the spectra of fats and oils (butter fat, pig milk fat, soybean oil and palm oil) with those of pure triglycerides. Secondly, the NIR spectra of these fats and oils were reconstructed by summation of the triglyceride spectra, which are multiplied by factors corresponding to the fatty acid composition of the sample determined by GC. The calculated spectra agree with the originals, especially for that of soybean oil. However, in order to reconstruct spectra precisely, it may be necessary to reevaluate the loading wt. of each triglyceride, which was equal in this study. AA

1987

Kawanishi (K), Aoki (K), Hashimoto (Y) and Matsunobu (A). **Free primary alcohols in oils and waxes from germs, kernels and other components of nuts, seeds, fruits and cereals.** *Journal of the American Oil Chemist's Society* 68(11): 1991: 869-872

The composition of free primary alcohols in oils and waxes obtained from the germ, kernel, seed coat, shell and skin (peel) of various nuts, seeds, fruits and cereals and from the chrysalis of silkworm was examined. These alcohols are usually present in small amounts, along with large quantities of hydrocarbons, esters and glycerides in oils and waxes. Thus, it is necessary to remove hydrocarbons, esters and glycerides to analyze the alcohols. It was found that preparative reverse-phase thin-layer chromatography (TLC) was the best way to isolate alcohols from oils and waxes. Gas liquid chromatography (GLC) then detected hexacosanol, octacosanol and triacontanol in the oils and waxes. Octacosanol usually was the predominant alcohol. Relationships between the organs from nuts, seeds, fruits and cereals and the contents of octacosanol are suggested. For example, degermed kernels contained two times more octacosanol than the germ, and the skin coat and shell contained one-half and one-fortieth the octacosanol of the germ, respectively. AA

1988

Al-Kahtani (HA). **Survey of quality of used frying oils from restaurants.** *Journal of the American Oil Chemist's Society* 68(11): 1991: 857-862

Commercial frying practices and frying conditions at 62 restaurants or fast-food outlets were investigated and the quality of their discarded frying oils was evaluated by several standard lab. methods: total polar components (TPC), free fatty acids (%FFA), p-anisidine and peroxide values, colour, viscosity, C18:2/C16:0, absorbance at 232 and 268 nm, and 5 quick test methods (Foodoil sensor, Oxifrit (RAU-Test), Fritest, Veri-Fry-TAM 150, and Veri-Fry-FFA 500). Frying techniques varied from primitive traditional practice at traditional shops to modern spohisticated frying procedures at some franchise restaurants. Discarded oils appeared to be heat-damaged to a varying extent according to the degree of quality control applied by the corresponding restaurants. Test methods were shown to possess different statistical correlations. Highly significant correlations were found between TPC and Foodoil sensor (c.f = 0.93) and between Oxifrit and Fritest (c.f = 0.94), each of which were also correlated relatively well to the TPC. Peroxide value followed by % FFA did not significantly ($P < 0.05$) correlated with the TPC. Significant linear relationships (P 0.05) were found between the TPC

and each of the other indicators but % FFA and peroxide value. AA

1989

Krishnakumari (B), Ravikumar (YVL), Snehalatha Nair (CK) and Bhale Rao (UT). **Estimation of vegetable oils viscosity from iodine and saponification values.** *Indian Journal of Technology* 31(7): 1993: 547-549

The method consists of determining the Andrade constants A and B for each oil from the viscosity vs. temp. data and then relating these constants to the iodine/saponification ratio. The method tested for fatty oils of varied utilities and properties, could be used for quick design estimation and quality controlling of vegetable oils. SRA

Corn oils

1990

Macku (C) and Shibamoto (T). **The effect of glycine in the production of toxic volatile aldehydes from heated corn oil.** *Journal of the American Oil Chemist's Society* 68(11): 1991: 884-885

The fatty aldehydes generated from heated corn oil and from several corn oil/glycine mixtures were collected by a dynamic headspace sampling method and subsequently reacted with cysteamine to yield corresponding thiazolidines. Derivatized aldehydes were analyzed by a capillary GC with flame photometric detector. Six fatty aldehydes, including formaldehyde and acetaldehyde, decreased in concn. in relation to increasing amounts of glycine in the oil. AA

Cottonseed oils

1991

Bland (JM), Conkerton (EJ) and Abraham (G). **Triacylglyceride composition of cottonseed oil by HPLC and GC.** *Journal of the American Oil Chemist's Society* 68(11): 1991: 840-843

The triacylglyceride (TAG) components of cottonseed oil were isolated and positively identified by a combination of HPLC and GC. Both reversed-phase HPLC and capillary GC were capable of separating the oil into TAG peaks. These peaks were isolated by HPLC and their component acyl groups were converted to fatty acid methyl ester derivatives. The acyl constituents for each TAG were determined by GC analysis, thus positively identifying the TAG associated with each HPLC peak. The TAG elution order agreed with predictive methods. HPLC and capillary GC peaks were correlated by peak area, thus identifying the GC peaks. The corresponding GC elution order of TAG also agreed with predictive methods. AA

Groundnut oils

1992

Mahadevaiah (B), Indiramma (AR) and Bakasubrahmanyam (N). **Packaging and storage studies on double-filtered groundnut oil.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 196(3): 1993: 252-254

Packaging and storage studies of double-filtered groundnut oil was carried out in different multilayer film pouches based on non-nylon, nylon and polyester (PET) layers and PET bottles at 27°C and 65% RH and 38°C and 90% RH. The groundnut oil keeps better in multilayer film pouches consisting of nylon and PET films and PET bottles than in non-nylon-based film pouches under both conditions. AA

Soybean oils

1993

Clark (PK) and Snyder (HE). **Effect of moisture and temperature on the phosphorus content of crude soybean oil extracted from fine flour.** *Journal of the American Oil Chemist's Society* 68(11): 1991: 814-817

Analysis of total oil content in soybeans is usually done by extracting flours, whereas commercial extraction for recovery of oil is done by extracting flakes. It has recently become apparent that P content of crude soybean oil extracted from flours can vary depending on extraction temp. and flour moisture. In this study, flour moistures below 6% yielded crude oil with low P (15 p.p.m.), but P in the oil increased rapidly to 260 p.p.m. at 9% moisture. When temp. of the extraction was increased from 25 to 60°C, the P in extracted oil also increased for moisture contents of 6.6% and 8.3%, but not for moisture contents of 5% and 3%. In addition to the effects of extraction temp., it was found that preheating whole soybeans at various temp. affected P in oil from extracted flour. Preheating at 130°C caused high P content regardless of how dry the flour was, whereas preheating at 100°C or below caused P content that increased with increased moisture. The response of P content in crude oil to temp. and moisture may be useful in improving the quality of commercially extracted soy oil. AA

1994

Husain (S), Sastry (GSR) and Prasada Raju (N). **Molecular weight averages as criteria for quality assessment of heated oils and fats.** *Journal of the*

American Oil Chemist's Society 68(11): 1991: 822-826

A simple method for quality assessment of heated oils and fats is described. The proposed method involves precise detn. of mol. wt. averages (MWA) viz., the wt. av. mol. wt. (Mw), the number av. mol. wt. (Mn) and the Z-average mol. wt. (Mz) by high performance size exclusion chromatography (HPSEC) and their quantitative correlation to percent polar material obtained by column chromatography (CC). Change in MWA on heat treatment of 14 different edible oils and fats at 180 plus or minus 2°C for eight 8 h days is studied. Relative standard deviations and regression coeff. of correlation between MWA and their ratios (Mw, Mn, Mz, Mz/Mn, Mw/Mn and Mz/Mw) vs percent polar material have been reported. Probable discard time was predicted for all the oils based on the above-mentioned correlations and also from the percent of high mol. wt. (H. Mwt.) species formed. It was observed that the oils which are generally recommended for coronary patients deteriorated faster. A possibility of extending this methodology to frying oils is suggested. AA

Sunflower oils

1995

Herrera (ML), Segura (JA) and Anon (MC). **Crystalline fractionation of hydrogenated sunflower seed oil. I. HPLC analysis.** *Journal of the American Oil Chemist's Society* 68(11): 1991: 793-798

Crystalline fractionation of hydrogenated sunflowerseed oil was performed and the chemical composition of the separated fractions at different temp. was determined. The results show that the triglycerides obtained after a short retention time (< 16.4 min) were enriched in the low-temp. fractions (lower than 22°C), the triglycerides of long retention time (more than 21 5 min) were conc. in the higher-temp. fractions (higher than 30°C), and the triglycerides of medium retention time (between 16.4 and 21.5 min) were conc. in the medium-temp. fractions (22°C to 30°C). The partition ratio of triglycerides with retention times of 8.8, 12.5, 16.5, 21.5 and 29.1 min was increased as a function of the fractionation temp. AA

1996

Herrera (ML) and Anon (MC). **Crystalline fractionation of hydrogenated sunflower oil. II. Differential scanning calorimetry (DSC).** *Journal of the American Oil Chemist's Society* 68(11): 1991: 799-803

This study explored the thermal behaviour of hydrogenated sunflowerseed oil sample used in margarine manufacture which had been previously fractionated by crystallisation at different temp. Calorimetric diagrams showed that areas per gram were larger when solid samples, rather than liquids, were considered. Samples of high crystallization temp. were found to have components with high fusion points that were not present in fractions of lower crystallization temp. This means that more saturated triglycerides are present in solids as well as in fractions crystallizing at high temp. (above 30°C). AA

SPICES AND CONDIMENTS

1997

Sasikumar (B), Rema (J) and Ravindran (PN). **Vanilla.** *Indian Cocoa, Arecanut* 16(1): 1992: 6-10

Important vanilla growing countries are listed. *Vanilla fragrans* Salisb syn., *V. planifolia* Andr. (Mexican), *Vanilla pompona* Sch. (West Indian) and *Vanilla tahitensis* (Tahitian) are the 3 important sp. of vanilla. Details on climate, soil, propogation, planting, aftercare, pruning, manuring, flowering, fertilisation, harvesting, curing, sorting, grading, aroma, flavour quality, production, trade, health effects, pests, diseases, spoilage and utilization of vanillin (a flavouring substance from vanilla beans) are given. GS

1998

Kumar (KR), Subramanian (BG) and Indiramma (AR). **Studies on the storage characteristics of *Kodbale*. A popular Indian spicy savoury.** *Journal of Food Science and Technology (India)* 30(4): 1993: 269-274

Moisture sorption isotherm of *kodbale* showed 10.01% (dry basis) equilibrium moisutre content at 56% RH being critical of crispness and acceptability. Brunnauer-Emmett-Teller (BET) and Guggenheim-Anderson-de-boer (AGB)-monolayer moisture content was 4.60%. *Kodbale* packed in polyamide, based coextruded film and metallized polyester-polyethylene laminate with ambient air and nitrogen gas flushing indicated shelf-life of 60-80 days at 38°C, 90% RH and 120 days at 27°C, 65% RH. Gas flushing and polyamide material gave added protection against deterioration during storage. SD

Papads

1999

Manan (JK), Kulkarni (SG) and Shukla (IC). **Studies on preparation, packaging and storage of wheat papads.** *Beverage and Food World* 20(3); 1993; 19-21, 22

Whole wheat grains was soaked in sulphited and acidified water for 72 h at 30 plus or minus 5°C with change of water every 24 h. Papads made from this wheat yielded a good product upon deep fat-frying at 180 plus or minus 0°C with respect to sensory quality attributes viz. fluffy white appearance, texture and flavour. ERH was 55% and the product can be stored in polypropylene bags for 6 months at room temp. (18-31°C). BV

Spices

2000

Pradeep (KU), Geervani (P) and Eggum (BO). **Influence of spices on utilization of sorghum and chickpea protein.** *Plant Foods for Human Nutrition* 41(3); 1991; 269-276

The effect of 8 Indian spices - red chillies (*Capsicum annum*), black pepper (*Piper nigrum*), coriander seeds (*Coriandrum sativum*), cumin seeds (*Cumin cyminum*), garlic (*Allium sativum*), asafoetida (*Ferula foetida*), dry ginger (*Zingiber officinale*) and ajowan (*Carum copticum*) on the protein quality of sorghum (*Sorghum vulgare* var. Dabar) and chickpea (*Cicer arietinum*) were studied. The addition of spices did not have any significant effect on the true protein digestibility (TD), biological value (BV) and net protein utilization (NPU) of chickpea diet. The BV of sorghum diets with spices (red chilli + coriander (1:1) mix, black pepper + cumin (1:1) mix, coriander and cumin) was significantly higher than that of control diet. No significant differences was observed in the TD's of control and experimental sorghum diets except for diet having garlic, which had significantly lower digestibility ($P < 0.05$) than other groups. GS

Chillies

2001

Bernal (MA), Calderon (AA), Pedreno (MA), Munoz (R), Barcelo (AR), Merino De Cacres (F). **Dihydrocapsaicin oxidation by *Capsicum annuum* (var. annuum) peroxidase.** *Journal of Food Science* 58(3); 1993; 611-613, 679

Oxidation of dihydrocapsaicin (8-methyl-N-vanillyl-6-nonanamide) by peroxidase (EC 1.11.1.7) from *C. annuum* var. annumm fruits yielded one absorbent oxidation product with ε_{262} = $4.7\ 10^3\ M^{-1}\ cm^{-1}$. Dependence of oxidation rate on dihydrocapsaicin and H_2O_2 concn. revealed Michaelis-Menten type kinetics with inhibition at high substrate concn. and optimal pH near 6.0. Dihydrocapsaicin was oxidized by pepper peroxidase, and participation of peroxidase in capsaicinoid metabolism of pepper fruits should be taken into account. AA

Coriander

2002

Thomas (PP), Gopalakrishnan (N), Sudhilal (N), Poulose (TP) and Varghese (E). **A simple method for the separation of stones from coriander seeds based on the use of fluidization technique.** *Journal of Food Science and Technology (India)* 30(4); 1993; 303-305

A simple method for removal of stones (5%) from coriander seeds is reported. It works on the principle of min. fluidization velocity differences of stones and seeds when the mxiture is subjected to fluidization. SD

Garlic

2003

Mahendra Kumar Jain and Rafeel Apitz-Castro. **Garlic: A product of spilled amborsis.** *Current Science* 65(2); 1993; 148-156

Molecular, biochemical and physiological basis for the antithrombotic effect of garlic is reviewed in the light of vampire-repellant action of garlic; the active ingredient causing antiplatelet activity; chemical components of garlic including the steam-distillate and the potions; the antithrombotic action of ajoene; biochemical locus of action of ajoene; signal transduction pathway; and the possible uses of ajoene. KAR

Pepper

2004

Varadharaju (N) and Sreenarayanan (VV). **Inclined belt cleaner for pepper.** *Indian Cocoa, Arecanut* 16(1); 1992; 3-5

A power operated pepper cleaner was designed, developed and evaluated. The cleaner mainly consists of a endless flat canvas belt, feed hopper with fluted roller and separate outlets for pepper and foreign materials. The unit is powered by 0.5 hp, electric motor. The cleaner was tested with different combinations of materials, slope, speed of the rollers and feed rate. The best cleaning efficiency of 99.5% was achieved at an inclination of 20° and the roller

speed of 100 r.p.m. with the canvas belt. The optimum feed rate is 50 kg/h and the cost of the unit is Rs. 6,000. The performance and the cost of operation of the unit were evaluated and compared with the manual cleaning of pepper. AA

SENSORY EVALUATION

Nil

FOOD STORAGE

2005

Bopaiah (BM). **Deterioration of processed cocoa beans in storage and mycotoxin.** *Indian Cocoa, Arecanut* 16(1): 1992: 11-13

Moisture content, mould growth and insect infestation of processed cocoa beans during storage were recorded at 12 wk intervals upto 48 wk. Mould and insect damage increased after 36 wk of storage. Moisture content increased with prolonged storage. Mycotoxin was detected in the mouldy beans. GS

INFESTATION CONTROL AND PESTICIDES

2006

Maroni (M) and Fait (A). **Health effects in man from long-term exposure to pesticides: A review of the 1975-1991 literature.** *Toxicology* 78(1-3): 1993: 1-180

404 references. GS

BIOCHEMISTRY AND NUTRITION

2007

Asha Kawatra, Kapoor (AC) and Seghal (S). **Hypocholesterolemic effect of guargum in overweight adults.** *Plant Foods for Human Nutrition* 41(3): 1991: 241-245

The effectiveness of guargum in reducing plasma cholesterol levels in over wt. adults was studied. The administration of guargum at the level of 15 g/day with normal diet for 6 wks produced significant (P less than or equal to 0.01) reduction in total cholesterol, LDL-cholesterol and total cholesterol to HDL-choleterol (17%) ratio. Intake of the fibre did not affect the concn. of HDL-cholesterol, but caused a significant reduction in concn. of LDL-cholesterol. GS

2008

Rankin (SA) and Pike (OA). **Cholesterol autoxidation inhibition varies among several natural antioxidants in an aqueous model system.** *Journal of Food Science* 58(3): 1993: 653-655, 687

Inhibition of cholesterol autoxidation by several natural materials was examined in an aqueous meat model system at pH 5.50 and 80°C. Antioxidant effectiveness was measured using the induction period for 7-ketocholesterol. An industrial rosemary oleoresin, quercetin, myricetin and BHA (included for comparison) had no antioxidant properties for cholesterol. All tocopherol treatments delayed cholesterol oxidation. The γ- and δ- treatments were most effective and α-tocopherol was least effective. No synergistic effects were observed with tocopherol blends. Antioxidants effective against unsaturated fatty acid autoxidation may not inhibit cholesterol autoxidation. AA

2009

Arteaga (GE), Li-Chan (E), Nakai (S), Cofrades (S) and Jimenez-Colmenero (F). **Ingredient interaction effects on protein functionality: Mixture design approach.** *Journal of Food Science* 58(3): 1993: 656-662

A ten-point augmented simplex-centroid design was used to study the effects of ingredient interactions on properties of food protein mixtures. Hydrophobicity, solubility and functional properties (emulsification and colour) of 3 ingredients (bovine casein and salt-extractable proteins from chicken breast muscle and beef heart) as well as mixtures of the ingredients were tested. Significant deviations were observed between experimentally measured properties of mixtures and values calculated assuming linear addition of individual ingredient properties. Regression models including significant interaction terms were calculated for ingredient-hydrophobicity and ingredient-functionality relationships, and used in computerized optimization of two hypothetical formulations. AA

2010

Abdollahi (A), Rosenholtz (NS) and Garwin (JL). **Tocopherol micro-extraction method with application to quantitative analysis of lipophilic nutrients.** *Journal of Food Science* 58(3): 1993: 663-666

A method proposed for determining vitamin E consists of extraction with n-hexane/2-propanol and separation by normal-phase HPLC. It was used to monitor tocopherol content of eggs metabolically

enriched with vitamin E. It accurately evaluated nutritional uniformity of many samples in a relatively short time. Chromatographic resolution showed α-tocopherol as the only major peak in the enriched eggs. Quantification with HPLC or GC demonstrated that the extraction technique could also be used to determine cholesterol and fatty acids. Results from eggs containing varied ratios of fatty acids indicate that the method did not differentially extract different types of fatty acids. AA

2011

Seetharamaiah (GS) and Chandrasekhara (N). **Comparative hypocholesterolemic activities of oryzanol, curcumin and ferulic acid in rats.** *Journal of Food Science and Technology (India)* 30(4): 1993: 249-252

The hypocholesterolemic effect of oryzanol, a mixture of ferulic acid esters of sterols and triterpenols, isolated from rice bran oil was compared with that of curcumin (diferuloyl methane, the yellow pigment of turmeric) and ferulic acid. Feeding 0.5% oryzanol, 0.15% curcumin or 75 mg% ferulic acid in the 1% cholesterol containing diet (HCD) for 7 wks caused a significant decrease in serum total cholesterol as well as (LDL + VLDL) cholesterol and an increase in HDL cholesterol. Serum lipoprotein (LDL + VLDL) concn. was also decreased. The ratio of LDL-cholesterol to HDL-cholesterol which was 24.9 on the HCD was decreased by 40% by oryzanol, 21% by cucurmin and 24% by ferulic acid. Oryzanol and curcumin lowered liver cholesterol levels, whereas ferulic acid was not effective. Oryzanol was a better hypocholesterolemic agent than curcumin or ferulic acid. AA

2012

Hori (K), Ishibashi (G) and Okita (T). **Hypocholesterolaemic effect of Indonesian palm sugar in rats.** *ASEAN Food Journal* 7(3): 1992: 161-162

The study was conducted to determine whether Indonesian palm sugar was effective in lowering cholesterol blood cholesterol in rate fed with high-cholesterol diet for 21 days. The composition of the diets was: 18% vitamin-free casein, 4% soybean oil, 4% lard, 1% vitamin mixture, 4% mineral mixture, 3% cellulose, 0.15% choline chloride, 0.5% cholesterol, 0.25% sodium cholate and 65.1% granulated case sugar or palm sugar. After 21 days, there was no difference in growth and food intake between the two test groups fed with cane sugar and palm sugar. The atherosclerotic index and liver lipids were high in the rats fed granulated cane sugar. The liver triglycerides and phospholipids in both groups were unchanged. The excretion of bile acids in faeces was more in the rats fed palm sugar. The faecal neutral sterols in both animal groups was similar. Study indicated that pal, sugar was a hypocholesterolaemic effect in the rats fed an antherogenic diet. SRA

2013

Davies (RL). **D-lysine, alloisoleucine and lysinoalanine in supplementary proteins with different lysine availabilities.** *Journal of the Science of Food and Agriculture* 61(2): 1993: 151-154

D-lysine, alloisoleucine and lysinoalanine were determined in 16 commercial protein supplements on which lysine availability had been measured by slope-ratio assay with pigs and by chemical dinitrophenylation. About 2.5% of lysine was racemised by protein hydrolysis in 6 M HCl. Only 3 of 10 samples with poor lysine availability by slope-ratio assay contained significantly more D-lysine than control proteins ($P < 0.01$). D-lysine was not significantly correlated with lysine than availability by either method; nor did it improve the poor correlation between the slope-ratio assay and dinitrophenylation. The highest level of alloisoleucine was less than 1.4% that of isoleucine. In all proteins except skim milk powder lysinoalanine occurred at 0.3% or less of the corresponding lysine level. Neither alloisoleucine nor lysinoalanine was related to lysine availability. AA

TOXICOLOGY

2014

Nagaraja (TN) and Desiraju (T). **Effects of chronic consumption of metanil yellow by developing and adult rats on brain regional levels of noradrenaline, dopamine and serotonin, on acetylcholine esterase activity and on operant .conditioning.** *Food and Chemical Toxicology* 31(1): 1993: 41-44

Metanil yellow is the principal non-permitted food colour used extensively in India. The effects of long-term consumption of metanil yellow on the developing and adult brain were studied using Wistar rats. Regional levels of noradrenaline, dopamine and serotonin, activity of acetylcholine esterase (AChE), and operant conditioning with food reward were assessed in rats fed, metanil yellow and in controls. In the treated rats the amine levels in the hypothalamus, striatum and brain stem were significantly affected, and the changes were not generally reversible even after withdrawal of metanil yellow in developing rats. The striatum showed an early reduction of AChE activity, whereas the hippocampus showed a delayed but persistent effect

of reduced AChE activity. Treated rats also took more sessions to learn the operant conditioning behaviour. These effects on these major neurotransmitter systems and on learning, indicate that chronic consumption of metanil yellow can predispose both the developing and the adult central nervous system (CNS) of the rat to neurotoxicity. AA

FOOD LAWS AND REGULATIONS

2015

Pruthi (JS). **International legislation of food irradiation - present scenario. Part III A: Spices, tea, coffee, cocoa etc. Part III B: Cereals, millets, pulses and oilseeds.** *Beverage and Food World* 20(3): 1993: 13-14

This paper reports the existing country-wise status of legislation on irradiation of spices, tea, coffee, cocoa, etc and cereals, millets, pulses and oilseeds alongwith max. permitted dose of γ-irradiation, purpose of irradiation, type of clearance and the official approved date therefore. BV

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